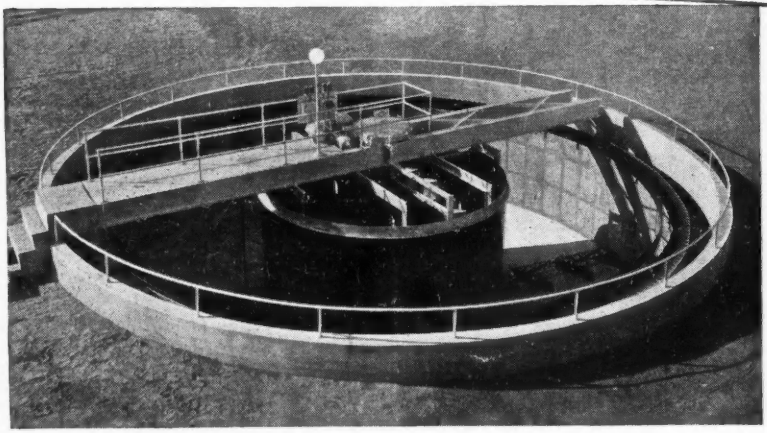
TECHNOLOGY DEPARTMENT

THE CHEMICAL AGE

VOL LVII 13 SEPTEMBER 1947 No 1470

PUBLIC LIBRARY
OCT 1 - 1947
DETROIT

Dorr-Oliver

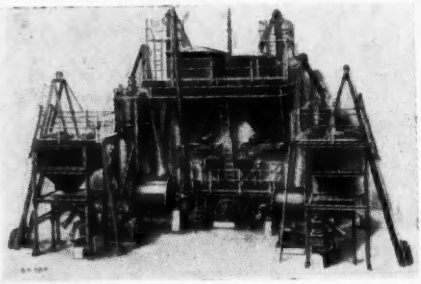


Continuous Processes

FLOCCULATION Building up dense, quick-settling floccs by promoting a succession of gentle impacts between the fine nuclei in a liquid suspension, the Dorr Clariflocculator not only speeds up the settling rate of the solids, but collects in the flocc an appreciable proportion of otherwise unsettleable matter.

In the Dorr Clariflocculator the suspension is flocculated in the central compartment, from which it passes without any disturbance of the fragile flocc to the outer clarifying zone where the settling takes place. The liquid then overflows a peripheral weir, while the solids are mechanically raked to the sludge sump.

DORR OLIVER CO., LTD., ABFORD HOUSE, WILTON ROAD, LONDON, S.W.1.



CLOSED CIRCUIT GRINDING EQUIPMENT

Provides:
Automatic, Efficient and Dust Proof Production of Fine or Superfine Powders

Various types of grinding plants are available, to suit the treatment of friable, fibrous, medium hard, hard and abrasive materials.

BRITISH REMA

Small to large capacity equipments, Complete installations or individual machines.

Catalogue matter and full advice from :—

MANUFACTURING CO. LTD
PROPRIETORS: EDGAR ALLEN & CO. LIMITED
IMPERIAL STEEL WORKS:- SHEFFIELD 9

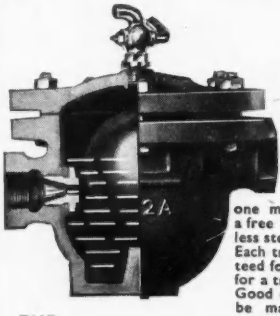
CRUICKSHANK'S

for

ZINC AMMONIUM CHLORIDE
ZINC CARBONATE Precipitated
ZINC CHLORIDE
ZINC CYANIDES
ZINC FLUOBORATE
ZINC FLUORIDE
ZINC OXIDE
ZINC SILICOFLUORIDE

R. CRUICKSHANK, LTD.
Camden Street, Birmingham, 1
Telephone : B'ham Central 8553 (6 lines)
Telegrams and Cables : Cruickshank Birmingham.

"Simplicity"
STEAM TRAPS



cannot jam or blow steam. Unique in design, foolproof in operation. "Simplicity" Steam Traps have only one moving part—a free floating stainless steel sphere. Each trap is guaranteed for years; send for a trap on trial. Good deliveries can be made in most sizes of traps.

THE
KEY ENGINEERING CO., LTD.
4 QUEEN VICTORIA STREET, LONDON, E.C.4
and TRAFFORD PARK, MANCHESTER.
Telephone : CITY 2235. TRAFFORD PARK 1903.

HYDROFLUORIC ACID

ANHYDROUS AND SOLUTIONS ALL STRENGTHS

Fluorides

Sodium, Magnesium, Potassium, Barium, Lead, Zinc and Artificial Cryolite.

Silico Fluorides

Magnesium, Potassium, Ammonium, Zinc, Barium.

Boro Fluorides

Sodium, Potassium, Ammonium, Lead.

Other Fluorides to Specification

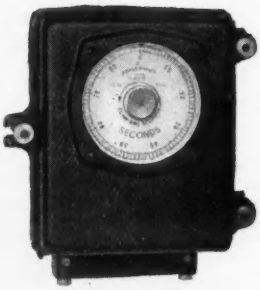
PURE ACIDS FOR ANALYSIS · PLATING CHEMICALS · ACCUMULATOR ACIDS

JAMES WILKINSON & SON, LTD.

TINSLEY PARK ROAD, SHEFFIELD, 9

'Phone 41208/9 'Grams "CHEMICALS" Sheffield

SYNCLOCK PROCESS TIMERS and CONTACTORS



for accurate timing of industrial and scientific processes

- The Synclock Synchronous Self-Starting motor ensures accurate timing and repetition when connected to a time controlled alternating current supply.
- Wide range of full scale settings are available in Seconds, Minutes or Hours.
- Unelapsed time is always visible.
- External time adjustments can be provided when required.
- Contacts (normally open or closed) reset automatically for next operation.

EVERETT EDGCUMBE

Manufacturers of all kinds of indicating and recording electrical instruments and photometry experts

COLINDALE WORKS, LONDON, N.W.9

ENTIRELY NEW

POLYGLYCOLS AND CARBOWAX

A series ranging from Hygroscopic Liquids to Waxy Low Melting Solids, freely soluble in water, insoluble in oils.

FOR RUBBER MOULD AND TEXTILE FIBRE LUBRICATION, WASHABLE PHARMACEUTICAL OINTMENTS, WATER PAINTS, CERAMIC COLOURS AND GLAZES, COSMETIC PREPARATIONS, Etc.

Further information and samples from :—

GENERAL METALLURGICAL AND CHEMICAL LTD.

120 MOORGATE, LONDON, E.C.2 MONarch 4328

62 MARKET ST., MANCHESTER, 1 BLAckfriars 8750

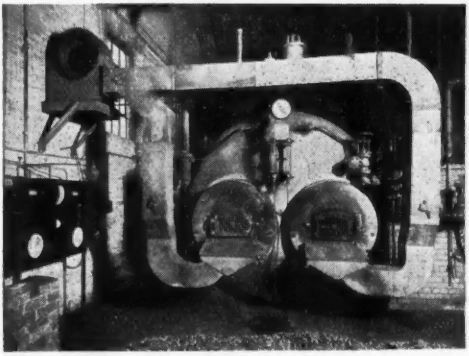
YOU CAN DEPEND UPON
CC DRUMS
They are built to withstand hard service and by reason of their long life are most economical in use.
HEAVY We'ded Kegs from 5 gallon upwards, Drums from 20 to 50 gall.
We regret that delay in delivery is sometimes unavoidable owing to material and labour shortages.
FOR EVERY PACKING PURPOSE
THE CYCLOPS ENGINEERING CO. LTD. VICTORIA CRESCENT BURTON-ON-TRENT

Clinton Wa.l

INDEX TO ADVERTISERS
IN THIS ISSUE

	Page
Allen Athole G. (Stockton) Ltd.	ix
Automatic Coil Winder & Electrical Equipment Co., Ltd.	x
Baker Perkins, Ltd.	v
Blackwells Metallurgical Works Ltd.	xxiv
British Drug Houses Ltd., The	377
British Gas Council, The	iv
British "Rema" Manufacturing Co., Ltd., The	Cover ii
British Tar Products, Ltd.	xviii
Brough, E. A., & Co., Ltd.	xvi
Chemical Engineering & Wiltons Patent Furnace Co., Ltd., The	iii
Classified Advertisements	xx, xxi, xxii
Coastwise Petroleum Co., The	xi
Cruickshank, R., Ltd.	Cover ii
Cyclops Engineering Co., Ltd., The	ii
Derbyshire Stone Ltd.	xiv
Dorr Oliver & Co., Ltd.	Front Cover
Dryden, T., Esq.	xiv
E.C.D., Ltd.	viii
Electronic Instruments Ltd.	xxiii
English Grains Co., Ltd. (Yestamin) The	vi
Evans Adlard & Co., Ltd.	xxii
Everett, Edgcumbe & Co., Ltd.	i
Foyle, W. & G., Ltd.	xxiv
Garcia, S., Esq.	xix
General Metallurgical & Chemical Ltd.	ii
Hardy, M. W., & Co., Ltd.	xxiii
Harris, Francis W. & Co., Ltd.	xxiv
Haughtons Metallic Co., Ltd.	xxiv
I.C.I. Ltd.	xvii
Jobling, James A. & Co., Ltd.	xv
Kent, James Ltd.	Cover iii
Kestner Evaporator & Engineering Co., Ltd.	xii, xxiv
Key Engineering Co., Ltd., The	Cover ii
Leigh & Sons Metal Works	xxiv
Leitch, John W. & Co., Ltd.	x
Lennox Foundry Co., Ltd.	xxiv
Metafiltration Co., Ltd., The	xvi
Metropolitan-Vickers Electrical Co., Ltd.	Cover iv
Midland Bank, Ltd.	xv
National Enamels Ltd.	xxiii
Negretti & Zambra Ltd.	xii
Oliver Pell Control Ltd.	Cover iii
Perry & Hope Ltd.	xix
Reeve Angel, H. & Co., Ltd.	xxii
Robert & Co., Inc.	xii
Robinson, L. & Co.	vi
Shannon Ltd., The	377
Silica-Gel Ltd.	Cover iii
Spence, Peter & Sons, Ltd.	viii
Steel, J. M. & Co., Ltd.	xix
T. & T. Works Ltd.	xxiv
Tanks & Drums Ltd.	xiii
Thompson, John (Dudley) Ltd.	vii
Unifloc Reagents Ltd.	xviii
Universal Emulsifiers Ltd.	xiv
Walker, James & Co., Ltd.	Cover iv
Watford Chemical Co., Ltd.	iv
Wilkinson, James & Son, Ltd.	i

OVER 40 YEARS EXPERIENCE



IN THE MANUFACTURE OF FORCED DRAUGHT FURNACES FOR CHEMICAL WORKS STEAM BOILERS AND STILLS

Burning Fuels of any type and size

THE CHEMICAL ENGINEERING AND WILTON'S PATENT FURNACE COMPANY LIMITED. HORSHAM, SUSSEX.

Northern Office and Fuel Engineer:
T. G. Fegan, Cannonfield, Hathersage, Nr. Sheffield.
'Phone: **Hathersage 333**

'Phone: **Horsham 965**
'Grams: **Evaporator**

Miracles take a little longer

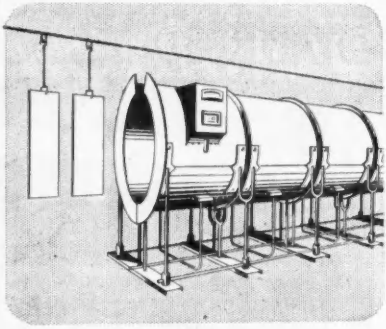
In our laboratory our chemists are happy—in a gloomy kind of way. You see, they're happy because they've evolved the exact emulsifier* to suit every industry and gloomy because SOMETHING DRIVES THEM ON. Sometimes in their cups they babble of the miracle of the *universal* emulsifier and perpetual motion.

Judging by the time taken in arriving at the first result, the miracle will have to wait a few days longer. So while they peer into their test tubes and mutter feverishly, why not take advantage of the unrivalled knowledge accumulated by them of emulsifiers and their idiosyncrasies! You're very welcome.

**The Estax and Promulsin range of Emulsifiers.*

WATFORD CHEMICAL COMPANY LTD.
30 BAKER STREET, LONDON, W.1
TELEPHONE: WELBECK 0264/8. TELEGRAMS: WATCHEMPRO, WESDO, LONDON

QUICK DRYING BY INFRA-RED



The gas-fired infra-red drying tunnel is robust, compact, inexpensive . . . easily constructed in different shapes and sizes without complicated auxiliary apparatus . . . giving even distribution of radiation and wide range of flux density at the turn of a tap . . . no material difference in drying time due to colour . . . low capital and fuel costs. Technical literature free on request.

FOR SIMPLICITY & CONTROL
THE CHOICE WILL BE

GAS

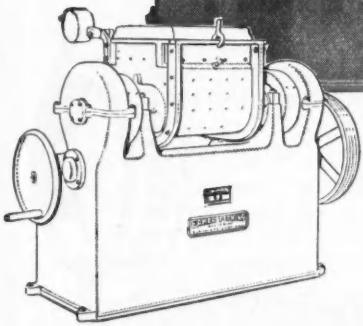
BRITISH GAS COUNCIL · 1 GROSVENOR PLACE, LONDON, SW1

The Basic Principle

of the

UNIVERSAL MIXER

is capable of adaptation to innumerable industrial purposes.



Here, for instance, is a machine of 18 gallons capacity, with our Sigma type blades carrying adjustable, serrated edges, revolving in opposite directions against a saddlepiece likewise serrated, to obtain a shredding action simultaneously with thorough incorporation of the mix.

The jacketed trough is lined with renewable steel wearing plates.

BAKER PERKINS LTD

WESTWOOD WORKS — PETERBOROUGH

An all-round Plus for YOUR food

As research goes deeper into the mysteries of vitamins and enzymes, the value of the B Vitamin group in releasing energy becomes more and more evident. Yestamin — pure, dried, de-bittered Yeast—is exceptionally rich in Vitamins B_1 and B_2 and also has a 40 per cent protein content. The Yestamin flavour is piquant and appetising. Supplies of Yestamin are good. Here is an all-round plus for *your* processed food which is of great value at the present time.

Vitamin B_1	2.10 *mgms. per oz.*	
Riboflavin (B_2)...	1.45	„ „
Niacin	9.5	„ „

YESTAMIN PURE DRIED YEAST

THE ENGLISH GRAINS CO. LTD., BURTON-ON-TRENT

There's nothing like a

"JUBILEE"

to ensure perfect satisfaction

USED EXTENSIVELY THROUGHOUT THE CHEMICAL INDUSTRY

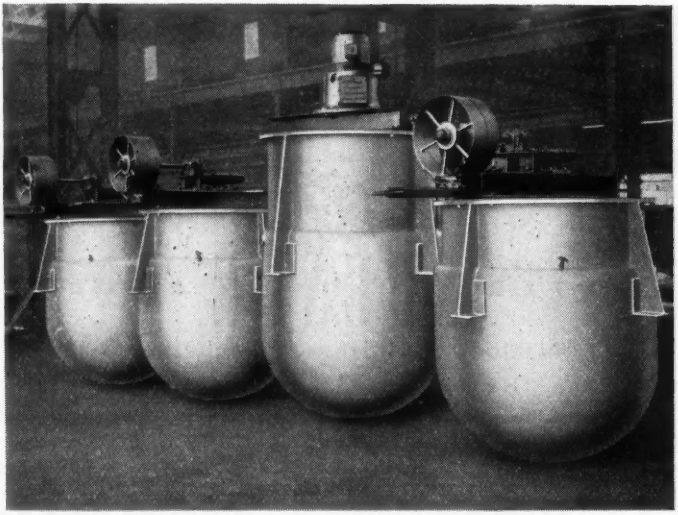
Remember the Name—

"JUBILEE" WORM DRIVE HOSE CLIPS

L. ROBINSON & CO.

6, LONDON CHAMBERS,

GILLINGHAM · KENT



Group of four all-welded stainless steel jacketed mixing vessels, complete with stirring gear.

For nearly half a century, John Thompson of Dudley have been pioneering in new ways of doing things in design and fabrication of all types of Chemical Plant in all types of metals.

MILD or STAINLESS STEEL, MONEL or ICONEL, NICKEL-CLAD STEEL, HOMOGENEOUS LEAD-LINED STEEL, RUBBER LINED STEEL and other special materials.

To-day, John Thompsons of Dudley pride themselves more than ever on their ability to solve seemingly insoluble problems which occur daily in the Chemical Industry.

John Thompson (DUDLEY) LIMITED

ROYAL AIR FORCES ASSOCIATION
BATTLE OF BRITAIN WEEK · 15TH-21ST SEPT
Support your Local Branch

Chemical Engineering Department DUDLEY (WORCS.)

Heavy Chemicals and Pharmaceutical Specialities

SPENCE CHEMICALS are backed by over 100 years of experience. Aluminous compounds are the chief products, but titanium salts, silicas and special pharmaceutical chemicals are also manufactured.

A booklet giving an abridged range of SPENCE chemicals will gladly be sent on request.

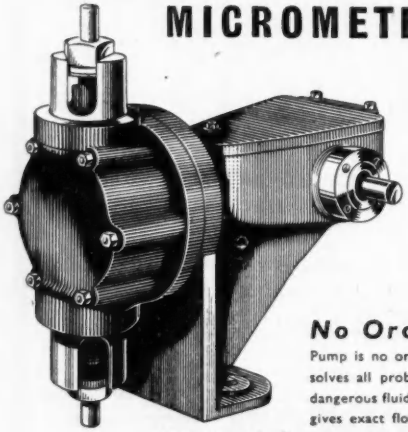
PETER SPENCE & SONS LTD

National Buildings, Manchester 3

London · Widnes · Goole · Bristol

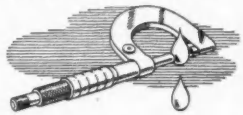
R.P 1868A

MICROMETER REGULATION



STANDARD MODEL 1/10 TO 40 GALLONS

LARGER MODELS AVAILABLE



No Ordinary Pump! This E.C.D. Injection Pump is no ordinary job. In one compact, slow-running unit it solves all problems of handling volatile, precious, corrosive, or dangerous fluids in accurate quantities. Simple Micro Adjustment gives exact flow rates from 1/10th to 40 gallons per hour with standard model. There are no glands to leak or wear and all working parts are oil-bath enclosed. Maximum working pressure of Standard Pump—150 lb. per square inch. Illustrated descriptive booklet on request.

E·C·D *Ltd* ENGINEERS

E·C·D LIMITED TONBRIDGE KENT *TEL:* TONBRIDGE 737

ATHOLE G. ALLEN (Stockton) LTD.

STOCKTON-ON-TEES,

CO. DURHAM

Telephone :
STOCKTON 6375 (3 lines)

Telegrams :
Chemicals, Stockton-on-Tees

Compared with Pre-War
our **PRODUCTIONS** now are :—

BARIUM CHLORIDE
600% greater

FERRIC & FERROUS CHLORIDE
150% greater

BARYTES
400% greater

TOLUENE NITRATION PRODUCTS
(excluding T.N.T.)
1100% greater

and we are
NOT MEMBERS OF ANY TRADE ORGANISATION

INTERMEDIATE PRODUCTS
ANILINE DYES
FAST BASES FOR ICE COLOURS

Benzol, Nitrobenzol, Binitrobenzol, Nitronaphthalene, Binitronaphthalene, Xylol, Nitroxylol, Binitroxylol
Xylidine, Toluol Ortho & Para Nitrotoluol, Binitrotoluol (All Grades)
Para Nitro Ortho Toluidine, Meta Nitro Para Toluidine
ORTHO TOLUIDINE PARA TOLUIDINE

Extensive Range of Oil Colours, Acid Colours, Basic Colours, Direct Colours, Pigment Colours,
Azoic Colours for Wool, also Colours suitable for all Trades
META TOLUYLENE DIAMINE META PHENYLENE DIAMINE

JOHN W. LEITCH & CO., LTD.

MILNSBRIDGE CHEMICAL WORKS

Telephone: 189-190 MILNSBRIDGE

HUDDERSFIELD

Telegrams: LEITCH, MILNSBRIDGE

INDIA
Khatau Valabhdas & Co.,
Vadgadi Bombay.

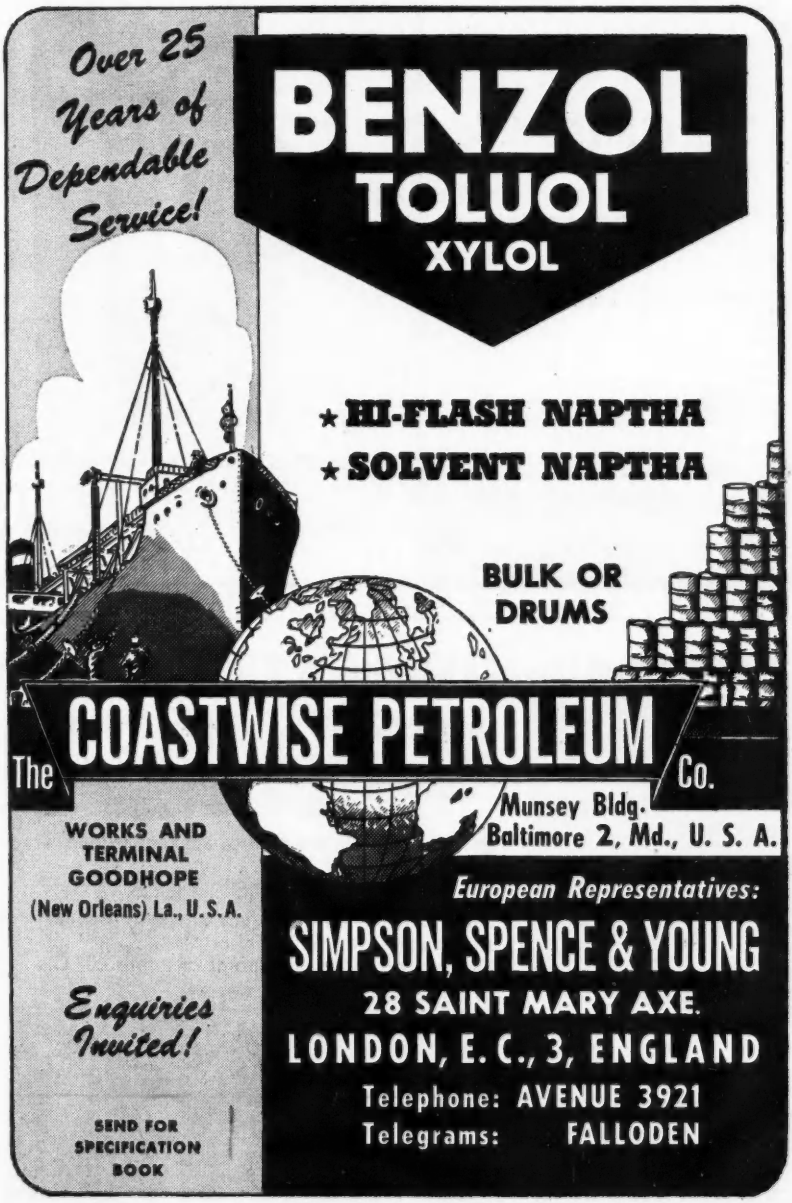
SCOTLAND
Kirkpatrick & Lauder Ltd.,
180, Hope Street, Glasgow, C.2

CANADA
Prescott & Co., Regd.
774, St. Paul St. West, Montreal

The AvoMeter is one of a useful range of " Avo " electrical testing instruments which are maintaining the " Avo " reputation for an unexcelled standard of accuracy and dependability—in fact, a standard by which other instruments are judged.

THE Model 7 Universal AvoMeter is the world's most widely used combination electrical measuring instrument. It provides 50 ranges of readings and is guaranteed accurate to B.S. first-grade limits on D.C. and A.C. from 25 c/s to 2 Kc/s. It is self-contained, compact and portable, simple to operate and almost impossible to damage electrically. It is protected by an automatic cut-out against damage through severe overload, and is provided with automatic compensation for variations in ambient temperature.

Sole Proprietors and Manufacturers :
AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT Co., Ltd.,
Winder House, Douglas Street, London, S.W.1 *'Phone : VICtoria 3404-9*


Over 25 Years of Dependable Service!
BENZOL
TOLUOL
XYLOL
★ HI-FLASH NAPTHA
★ SOLVENT NAPTHA
BULK OR DRUMS
The COASTWISE PETROLEUM Co.
Munsey Bldg.
Baltimore 2, Md., U. S. A.
WORKS AND TERMINAL GOODHOPE
(New Orleans) La., U.S.A.
European Representatives:
SIMPSON, SPENCE & YOUNG
28 SAINT MARY AXE.
LONDON, E. C., 3, ENGLAND
Telephone: AVENUE 3921
Telegrams: FALLODEN
Enquiries Invited!
SEND FOR SPECIFICATION BOOK

MANUFACTURERS
MANUFACTURERS AGENTS

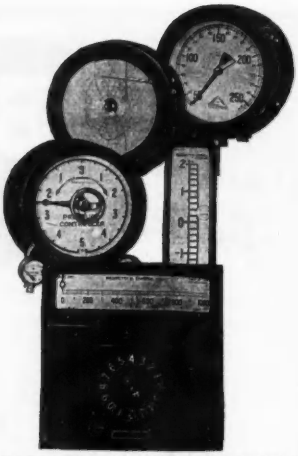
CHEMICALS
FOR ALL INDUSTRIES

DYESTUFFS

ESSENTIAL OILS
AROMATICS-COMPOUNDS-FLAVORS

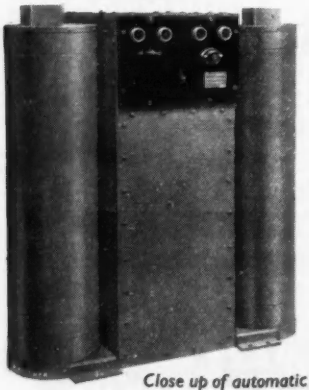
THE HOUSE OF QUALITY AND PERFORMANCE

ROBERT & COMPANY
INCORPORATED
60 Broad St., New York 4, N. Y., U.S.A.
Cable Address: COROBERT



INDUSTRIAL INSTRUMENTS
FOR
TEMPERATURE.
PRESSURE.
HUMIDITY.
LIQUID LEVEL.

NEGRETTI & ZAMBRA LTD
122 Regent St., London, W.1



Close up of automatic control gear for continuous gas drier illustrated above.

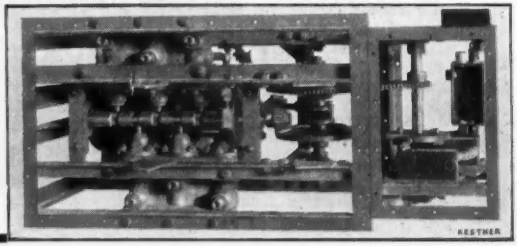
CONTINUOUS AIR & GAS DRYING

by use of **SILICA GEL**

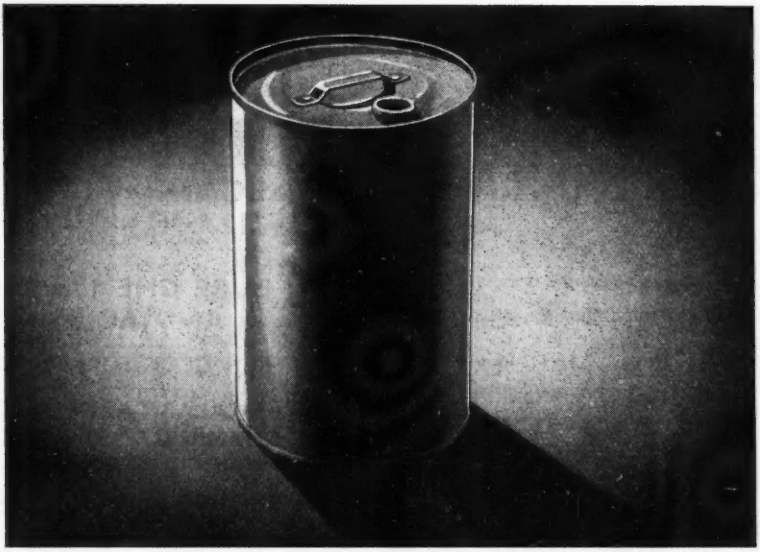
- Plants supplied from 1 to 3,500 c.f.m. and larger, if required.

Continuous operation achieved by—
Dual Absorber unit with *fully automatic* regeneration and change-over valves.
Dryness down to dew point of minus 60° C.

WRITE FOR LEAFLET 245.



Kestner's
Chemical Engineers :
5, GROSVENOR GARDENS, LONDON, S.W.I.



Spotlight on 'T & D' DRUMS

No. 1. FIVE AND TEN GALLON DRUMS

Tanks and Drums, Ltd., produce a drum to solve every liquid storage problem, from Motor to Marine Oils. Large or small, they are utterly dependable, the finest that quality, materials and first-class workmanship can produce.

Quality Motor Oils need 'T & D' DRUMS

We can help you . . . .

TANKS AND DRUMS LTD

BOWLING IRONWORKS, BRADFORD Telephone : BRADFORD 28285-6-7-8

LONDON OFFICE : 46 VICTORIA ST., S.W.1. TELEPHONE : ABBEY 3226

ACTIVATED CALCIUM CARBONATE

is a speciality of Derbyshire Stone Ltd., for processes where the utmost dispersibility and miscibility are an advantage.

Enquiries are invited from those interested in the supply of such powders. Samples and full information will be gladly provided. Please state nature of probable application of the powders. Problems investigated without obligation.

DERBYSHIRE STONE LTD

Bank House, Matlock, Derbyshire

'Phone: Matlock 396

T. DRYDEN

COMPLETE LABORATORY FURNISHER

FOR

THERMOMETERS

SCIENTIFIC GLASSWARE AND APPARATUS

PURE CHEMICALS AND ACIDS

HIGH GLASS FURNISHING

"ANALAR" ACIDS AND CHEMICALS STOCKED

LANDORE. SWANSEA

Phone: Swansea **3469.**

UNEMUL

(INERT ALUMINA GEL)

FOR EMULSIFYING AND SUSPENDING

INORGANIC · EDIBLE · VERSATILE

THE AGENT — Chemical inert ● Unattacked by bacteria and fungi ● Non-injurious to the human system A smoothly gelatinous cream or ointment base.

THE EMULSIONS — Easy to prepare ● Stable over considerable temperature range without change in viscosity. pH readily controlled ● Non-frothing ● Compatible with solids, dyestuffs, binders, etc.

AVAILABLE IN ANY QUANTITY IMMEDIATELY

UNIVERSAL EMULSIFIERS, LTD.,

INVICTOR WORKS, EAST MALLING, KENT. 'PHONE: WEST MALLING 2139

Four Important features of

PYREX REG. TRADE MARK BRAND
GRADUATED GLASSWARE

1. **Low co-efficient of expansion.**
   This is as low as 3·2 x 10^{-6} per degree Centigrade and prevents fracture from sudden changes of heat and cold.

2. **Robustness.**
   By reason of this low co-efficient of expansion, the structure of PYREX Glass can be made more robust than that of ordinary glass.

3. **Economical.**
   It therefore follows that losses from breakages due to frequent every-day handling are much reduced, thereby giving longer service.

4. **Accuracy in calibrating.**
   Made in two N. P. L. standards, namely, Class B. for everyday laboratory usage, and Class A. for more meticulous research or analytical work.

Ask for PYREX Brand and see that you get it!

PYREX REG. TRADE MARK BRAND
GRADUATED GLASSWARE

made by
James A. Jobling & Co. Ltd., Wear Glass Works, SUNDERLAND. G.55B

September

September is the month when schools reopen. Entering a new school, moving into a fresh form, embarking upon a different course of studies—these are important occasions in the lives of young people. To those who have them in their charge, provision for the future is an ever present obligation, and it is good sense to ensure that plans for the coming generation will be faithfully observed. In particular you must be able to rely on the availability of your trustees just at the moment when your children have need of them. The Manager of any branch of the Midland Bank will readily explain the services of the Bank's Executor and Trustee Company, where friendly personal assistance, based on wide experience, is always at your disposal in matters concerned with wills, trusts (educational or other) and settlements.

MIDLAND BANK EXECUTOR AND TRUSTEE COMPANY LIMITED

Every Package tells a Story

—a story written in £ s. d.—in repeat sales . . . a pleased and satisfied customer.

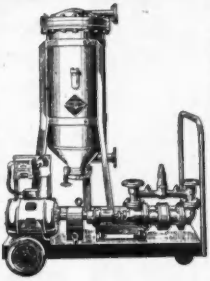
K.C.C. Drums, being strong and well built, can be relied upon to arrive with contents intact, and can be used again and again.
The special neck of a K.C.C. drum enables the contents to be poured " taper fashion " to the last drop. No waste from " overflow," no last drops let in the drum.
K.C.C. Drums can be thoroughly cleaned, and used for various contents.
The range of drums (both ordinary and K.C.C.) is comprehensive and despite the shortage of steel some sizes are still available.

BROUGH'S K·C·C· DRUMS

E. A. BROUGH & CO., LTD., LIVERPOOL AND SPEKE.

Starbright Filtrates

In one mechanical operation the Metafilter filters out every trace of solid matter.
Cleaning by reversal is equally simple—no filter cloths to clean—no expensive filter pads to replace.
A sound engineering job in stainless steel—monel metal—copper or steel.



Sizes from 10 gallons to 10,000 gallons per hour.

METAFILTRATION ★

PHONE: HOUNSLOW 1121/2/3
GRAMS METAFILTER HOUNSLOW

THE METAFILTRATION COMPANY LIMITED, BELGRAVE ROAD, HOUNSLOW, MIDDLESEX

To BED-BUGS

'GAMMEXANE'

spray containing the gamma isomer of benzene hexachloride is a deadly enemy. After treatment of 400 heavily infested houses with a spray containing 0.35% 'Gammexane,' bed-bugs were completely eradicated. On inspection two months later, no sign of reinfestation. Of low toxicity to man and animals, but to insect pests—by dust, spray or smoke—'Gammexane'

SPELLS *DEATH*

ICI

G.20

Consult IMPERIAL CHEMICAL INDUSTRIES LIMITED, NOBEL HOUSE, LONDON, S.W.1

B

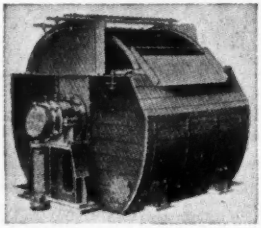
UNIFLOC
REGD. TRADE MARK

Plant for the Chemical Industry

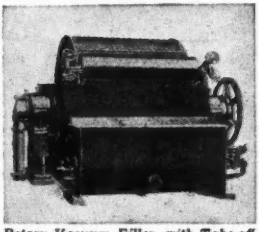
for ACID NEUTRALIZATION, CLARIFICATION OF LIQUIDS, DEWATERING OF SLUDGES, EFFLUENT PURIFICATION, FILTRATION AND FLOCCULATION, PICKLING LIQUOR TREATMENT, PURIFICATION OF TRADE WASTE, SEDIMENTATION AND THICKENING, SEPARATION OF SOLIDS FROM LIQUIDS, SODA RECOVERY. WET MATERIAL HANDLING

including

AGITATORS CAUSTICIZERS, CLARIFIERS, CLASSIFIERS CONVEYORS, DEWATERING MACHINES ROTARY VACUUM FILTERS SAND WASHERS, SLUDGE PUMPS, THICKENERS, etc.



Rotary Pulp Washing Machine, with Pitch Pine Trough, Wash Gear and Scraper Knife.



Rotary Vacuum Filter, with Take-off Roller and Repulper.

UNIFLOC REAGENTS LTD.,
— SWANSEA —

Phone: Swansea 5164 (3 lines)
Grams: Unifloc, Swansea

BRITISH TAR PRODUCTS

LIMITED

Makers of

PYRIDINE
ANTHRACENE OIL
CARBOLIC CRYSTALS
CRESYLIC ACIDS
META-CRESOL
NAPHTHALENE
TOLUOL
SOLVENT NAPHTHA
XYLOL

SALES OFFICE:
418A GLOSSOP ROAD, **SHEFFIELD, 10**
Telephone: 60078-9 Telegrams: CRESOL

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON Telephone: CENTRAL 3212 (16 lines)

SCOTTISH OFFICE:
116 Hope Street, Glasgow (Central 3970)

MIDLANDS OFFICE:
Daimler House, Paradise Street, Birmingham (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LVII
No. 1470.

13 September 1947

Annual Subscription, 26s.
8d. per copy; post free, 10d.

Bunk or Common Sense?

INCENTIVES to work are commonly regarded as desirable for everyone, and a necessity for most people. The student who works to pass his examination does so partly because there lies before him the incentive to pass, to achieve something, but ultimately because success may open the way to a career. The young man starting in industry does not do so because he likes work—there are some who do, but they are not typical of the species—but because through work he hopes to win a competence and perhaps a fortune. If there be those who doubt it, we will recount for their edification a story concerning a successful and prosperous man who started life in the coal mines. What induced you, we asked him, to enter the mines. His reply was that in his youth some mining men had rented his father's house for holiday and on returning the youth had explored the outhouses and had there found dozens of empty champagne bottles (this was before 1914). The thought had immediately struck his immature mind that here certainly was evidence that coal mining was a highly lucrative business. Fired by this incentive he had taken his mine manager's certificate and launched himself on a mining career. That he subsequently abandoned mining was due to the incentive not being great enough after the 1914-18 war.

Coming down the social scale, we would ask what makes the working man work? He does not in general do it for fun. He has worked in the past because otherwise he could not earn enough to keep himself and his family. Whatever makes life worth living in so-called civilised countries can only be got by giving to the community services in exchange—i.e. by earning wages. Once upon a time, there was also the incentive to earn as much as possible because one could buy luxuries with what one earned. The greater the amount of work done, the more of whatever was available from the common stock could be bought with the proceeds. On the other hand, if one did not work, one could get nothing, and if one did not work well, one got the sack. Thus, under what is described as "the bad old system of capitalism," a man had two incentives to work, one in front drawing him forward with the promise of reward; the other behind urging his feet onward with the wings of fear—fear of the sack and unemployment. Under these conditions of double incentive, the British working man did a good day's work for his pay. True, his pay was not always as high as it might have been, but at least the system worked, even though at times of bad trade there was much unemployment.

Lured by promises of political orators, the British working man has come to believe that there is untold gold locked up in the bank accounts of a few fortunate individuals, and that anyway "The State" has a bottomless purse. He has been encouraged to believe that it is possible for an earthly paradise to be set up in Britain in which the adoption of shorter working hours will prevent unemployment, while wages can go up and up to provide the highest standards of life for everyone. In consequence there is a total lack of the will to work, low output, and considerable "sales resistance" to any talk of the need

On Other Pages

Leader:
Bunk or Common Sense? 343
Notes and Comments:
At the B.A. 345
Isotope Future 345
New Coal Mines 345
Scapegoats 345
Ineptitude 346
Production Halted 346
Domination by a Few 346
More Chemical Workers 347
World Oil Shortage 347
Japan's Chemical Needs 347
Staggered Hours in Factories ... 348
Atomic Energy Rail Exhibition ... 349
Paint Research Association 350
Speke Penicillin Factory 351
Official Notices 352
River Pollution 353
Chemical Porcelain 355
Modern Coal Gasification Methods ... 357
I.G. Farben's Post-War Activities ... 361
Radio-active Isotopes 362
Superheating by Electricity 363
Shipment, Storage and Handling of Soda Ash 365
New Chemical Equipment 369
Nitrate Ban "Impracticable" ... 369
Revalidation of Indian Import Licences 370
Personal 372

for getting back to the old standards of hard work and hard living.

Nor is this confined to the working man. There are in high places, though perhaps for other reasons, those who show themselves to possess much the same spirit. Nationalisation is responsible for a great deal of this spirit. A nationalised industry consists of a great many individuals who have only one "boss" and no other outlet for their services, for they have no other experience. At all costs it is necessary for these men that they do not get themselves dismissed from their posts. They are, moreover, in competition with others for yet higher posts. The one thing that they must not do is to make a mistake. Better do nothing than do something wrong. This is the antithesis to private enterprise and it is killing nationalised industries. The Coal Board, for example, has been in operation nearly nine months. What has it accomplished? Reduction in output, widespread dissatisfaction, no improvement in coal quality, strikes and trade disputes, and now a considerable increase in the cost of coal. The Coal Board can only justify nationalisation by reducing the cost of getting coal and of supplying it to the public. So far from doing so it is finding it easy to do nothing but to pass on to the rest of the country the cost of doing nothing. The serious handicap that the increased cost of coal, and therefore of all fuel and power, will place upon British industry is self-evident. Our pithead cost of coal is about 42s. a ton. The U.S.A. pithead cost is about 14s. How can we compete? Why is there this apathy? Is it not because from the bottom right up to the top, though for different reasons at different levels, there is no incentive to do better while there is every incentive to do nothing?

Yet Mr. Morrison in a recent political broadcast said: "People talk a lot about what they call incentives. For myself I believe that a lot of this talk is bunk." The past history of the country no less than its present history suggests that while there will always be a certain number of people, amongst whom are to be numbered many pure scientists, who will work hard and give of their best because of the joy of achievement, most of us must have incentives to do so. To some the incentive may be the desire for fame, but to most it is the fear of the consequences of not doing the job to the best of one's ability and the anticipation of future reward for doing a job well. The economic system of the country has been allowed to get into such a condition that the ordinary incentives either do not exist or operate against a Government policy instead of with it. Is not one of the most urgent tasks of the Government today to remove the causes of this conflict? Mr. F. W. Paish in the latest review of the Westminster Bank has pointed out that many of the present frictions and frustrations are due to the fact that although many incentives continue to operate in greater or lesser degree they frequently pull in opposite directions: "Profitable transactions which before the war would have been both legal and generally regarded as socially desirable, are now often contrary to the law; while many of those that are still allowed can be carried out only after long and difficult

negotiations, often with several separate and imperfectly co-ordinated departments . . . Because the public gets its necessaries cheaply, it has more money to spare for expenditure on less essential requirements." We shall not follow Mr. Paish in his analysis of the general causes of the non-functioning of incentives. Is it not a fact, however, that there is little incentive to-day for the manufacturer to engage in new ventures involving enterprise and initiative, for he is largely prevented from doing so by controls and official inaction? The old incentives which caused the individual to give of his best have largely disappeared. Until these incentives return and the nation gets back to a system in which enterprise is rewarded we shall not see much improvement in the present situation.

NOTES AND COMMENTS

BECAUSE of the recently concluded International Congress of Chemistry, there were fewer papers than usual of interest to the heavy chemical industry at the British Association meeting at Dundee which finished last week. But on topics in the fine chemicals field and on subjects of direct and indirect interest to the chemical industry, there was plenty of discussion. For instance, penicillin and other antibiotics was fully discussed, and in this subject interest will grow in view of the announcement this week by the Ministry of Health that the preliminary trials of streptomycin, organised by the Medical Research Council, have proved sufficiently encouraging for it to be used for certain treatment. In view of some of the damning reports which came from America soon after the first flush of enthusiasm for this new drug had worn off, the news that the trials were not entirely negative is hopeful. Another discussion of interest to chemists was that on insecticides, where the problem of the place of insecticides in agriculture and food production gave rise to several interesting papers.

Isotope Future

A JOINT discussion, with the Physiology Section, on " The Use of Tracer Elements, Stable and Radio-active, in Biology and Chemistry " showed, as a recent dispatch from our New York Correspondent also intimated (CHEMICAL AGE, August 23), that radio-active isotopes have a big future before them as a research tool. In his report our correspondent gave several industrial research uses to which they are put already. The American Government has now agreed to allow the export of many groups of these substances. This news, which is very welcome indeed, will relieve the anxieties of many research workers who are awaiting supplies of these tracer elements which they could not possibly obtain in the near future from British sources.

New Coal Mines

ANOTHER interesting topic was the coal problem, which was discussed fully in the Geology Section. Questions ranging from the environment of the miner to the possibility of finding new coalfields came under review. In this latter connection it was interesting to find out from Dr. G. M. Lees that much exploration work is going on in several areas to find possible new coalfields. As a result of these explorations, one coalfield has been discovered in Central Lincolnshire, but it is, alas, too deep for present-day exploitation. This exploration work is obviously a long-term policy, as we have, so far as we can see, not enough miners to deal with our present coal mines.

Scapegoats

ONE evening while we were at Dundee, (it was a Sunday evening, and the typical Scottish sabbath was in full sombre progress) we spent some little time in the City Square listening to Mr. Strachey, the Minister of Food. The proposed food cuts, foreign travel cuts and basic petrol ration cuts had just been announced and were uppermost in the minds of most people, so Mr. Strachey was not able to evade talking about them. Although we were not prepared for any statesmanlike speech, we were appalled by what he did say. There was no defence of the food cuts. And the principal thing he had to say to the worker was " You may be badly off, but Lord, you should see what we've done to the middle class." It was a frankly class-warfare speech at its worst.

Speaking down to his predominantly working-class audience—and sometimes down to child level—he tried to mollify the Dundee men and women and take the edge off the food cuts by telling them that although they had suffered, the Government had made the middle-class, who would always be the first victims in any new austerity drive, suffer more. The Labour Party have often denied that they preach class warfare. For this claim to be true they must sit on some of their Ministers who, like Hitler, when in a hole " go for " the middle class and the so-called capitalists.

Ineptitude

THIS same class warfare is evident in the treatment, or lack of treatment, of the disgraceful Grimethorpe strike which is holding up production of coal, causing widespread unemployment, and affecting the chemical industry directly by fuel shortages. In this strike about 100 obstinate (or perhaps it may be "politically conscious") men, together with thousands of " sympathetic " strikers, have stopped the output of thousands of tons of coal since August 12. The authorities are treating them in a manner in which nervousness, apathy and tolerance are curiously combined, and which tells the men more clearly than words that the authorities are just going to let the strike drift on. They are clearly not going to take drastic action. The latest suggestion for ending the dispute comes from Mr. Horner, who has told the striking miners that they will not really have to work the longer stint if they go back to work while the proposed committee of inquiry, which he proposes, is preparing its report, because there is so much clearing up, etc., to be done that the report will be out before the miners have to work the extra two feet of coal-face. If this is put forward officially it will be a shameful retreat by the authorities. An ironic fact about this dispute is that the strikers are now accusing the " horde of bureaucrats " of being responsible for the trouble. How long since is it that they were clamouring for nationalisation of the mines? It does occur to us to wonder whether this kid-glove method of treatment would have been meted out to private employers had they dared to hold up the production of a vital essential commodity in these days. We have no doubt at all that any such hold up would soon have been broken.

Production Halted

AS a result of this strike unemployment is spreading throughout many industries. About 50 smelting furnaces in Sheffield's steelworks have closed with a loss of steel up to date of 15,000 tons. By the end of this week thousands of steel workers will be out of work or on short time. In the glass industry the shortage of coal has been felt too. Two glass bottle manufacturers near Pontefract have been closed indefinitely and another glass firm has given notice to close soon. Future coal production, too, will be affected as the production of coal-mining machinery will also be seriously affected. Severe gas cuts have already affected many areas of Yorkshire and may soon extend to other parts of the country.

Domination by a Few

ONE way in which a strike of this sort could be settled peacefully is to have a written and secret ballot of the men as to whether they wish to continue the strike or not. At present meetings are held and a show of hands taken to decide whether or not they shall stay on strike. It is obvious that the men sometimes vote for continuance of the strike out of fear of what may happen to them if they vote to go back or else from a feeling of not wanting to let their mates down, as they think, when in fact a majority are in favour of going back to work. Another point is that only a small percentage of the miners attend these meetings. A secret ballot by all the miners on the question of the resumption of work should be taken. We think a majority would then vote to go back. But if not, and they continue in their obduracy, then the Government should take drastic acton to put an end to this dispute which is endangering the whole of the country's economy.

U.S. to Control Steel Exports

The U.S. Government is to re-impose a strict control over steel imports as from October 1 next, from which date onwards licences to export will be issued only on individual orders, and there will be limits to the amount of steel a country may receive. Licences, which will be issued on an overall tonnage basis, will affect shipments of pig iron, iron and steel scrap, sheet steel and boiler plate. It is understood, however, that priority will be given to cargoes intended for reconstruction and basic industries overseas.

More Chemical Workers

THE steady increase in employment in the chemical industry is again reflected in the summary for June contained in the August issue of the Monthly Digest of Statistics, published by the Central Statistical Office (H.M.S.O., 2s. 6d. net).

In June 351,000 were employed in manufacturing chemicals, explosives, paints, oils, etc., as compared with 349,600 in May and 335,800 in June a year ago. The figures indicate incidentally the increasing employment of men and the smaller proportion of women, of the latter there being 118,100 on the labour strength in June, against 121,300 a year ago. The new grand total is substantially the largest since the need for large output from the Government explosives factories ended in June, 1945.

A record of production, use and stocks of non-ferrous metals and chemicals in June and in June 1946 is provided in the following table:—

	June, 1947 Thousand tons			June, 1946 Thousand tons		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Refined lead		16.9	22.3		16.4	33.7
Tin metal		2.18	15		1.92	22.4
Virgin aluminium	2.23	13.3		2.25	7.9	
Magnesium	0.21	0.63		0.12	0.20	
Virgin copper		31.1	102.3		23.7	80.9
Virgin zinc		19.2	26		17.1	78.2
Molasses	10.1	*31.8	124.1	7.6	*22.9	178
Industrial alcohol†	2.08	2.45	4.61	1.50	2.13	2.33
Sulphuric acid	110.0	111	66.8	112.9	106	64.9
Pyrites		14.3	84		17.2	88
Sulphur (for acid)		18.3	69.2		17	58.1
Spent oxide		14	149.7		15.6	139
Superphosphate	80.9	60.2	99.7	75.1	64.8	66.7
Compound fertilisers	76	29.1	89.6	80.9	18.1	116.6
Ammonia		31.28	3.28		25.51	3.11
Phosphate rock		60.1	141.1		50.2	153.8
Phosphate rock (for industry)		5.40	33		4.41	15

*For distilling. † In million bulk gallons

WORLD OIL SHORTAGE

LEVER'S CHAIRMAN REVIEWS THE PROSPECTS

AN authoritative review of the current world condition of shortage of oils and fats and of means of relieving it was given by Mr. Geoffrey Heyworth, presiding this week at the annual general meeting of Lever Brothers and Unilever, Ltd.

"In all," he said, "I estimate that the 1947 world production of oils and fats is about 2,500,000 tons per annum below the pre-war figure of nearly 20,000,000 tons. If one takes into account the fact that the population of the world must have increased by about 8 per cent since 1939, which would mean an additional requirement of 1,500,000 tons per annum, the total deficit compared with pre-war quantities amounts to about 4,000,000 tons."

More Whale Oil

Among the measures which he recommended to alleviate the shortage was the temporary suspension as an emergency measure of the international agreement limiting the taking of whales, which this year restricted whale oil production to 320,000 tons, as compared with the 500,000 tons taken in a season pre-war. Other measures he mentioned were the ending by co-operation of the competitive buying by European countries which had resulted in this country paying for 10 per cent of its oils, excluding linseed, three times as much as for the remaining 90 per cent, the granting of larger export allocations by the United States and the Philippines, and additional production by the extension of such enterprises as the East African groundnut scheme and the increased use of mineral oils as detergents.

Japan's Chemical Needs

CHEMICALS and allied materials and some metals predominate among the commodities which Japan is anxious to import. The Board of Trade, publishing a list of requirements for which Tokyo is seeking supplies, emphasises that the majority of the commodities are still subject to overriding U.K. export restrictions and that no exception will be made for supplies to Japan.

The list of urgent requirements includes the following: Rubber, paraffin wax (all grades), carbon black, lead, fats and oils, copra, silicon steels (sheets), pig iron, animal glue, crushed bones, sinews and fleshings, magnesia clinkers, graphite, mica, lacquer (natural), soda ash, caustic soda, shellac, tin plate, furnace fuel oil, dyes (acid, basic, direct chrome), rosin, bauxite, tungsten concentrate, rayon pulp.

STAGGERED HOURS IN FACTORIES

Relaxation of Restrictions

IN order to facilitate the spreading of the electricity load by means of staggered hours of work in factories, the Minister of Labour and National Service has made a new Order entitled the Factories (Hours of Employment in Factories, using Electricity) Order, 1947.* The Order allows conditional exemption from some of the provisions of the Factories Act, 1937, which restrict the hours of employment of women and of young persons under the age of 18. The Order applies to factories in which the electricity generated outside is used for any purpose other than lighting or ventilating the workrooms or other parts of the factory.

Certificates

The Order comes into force on September 22, but a factory occupier may not avail himself of any of the relaxations that it allows unless he first obtains permission from the District Inspector of Factories, who will issue a certificate to that effect. Before granting a certificate the District Inspector will take into account any scheme or proposal made by the Regional Board for Industry, together with the views of the appropriate local trade union representatives with the object of spreading the electricity load.

Certificates issued by a District Inspector may permit the following relaxations:—

(*A*) *Day Work.*

(1) Employment may begin at 6 a.m. (instead of 7 a.m.) for persons aged 16 or over, or, alternatively,

(2) Except on the weekly short day, the period of employment may end at 11 p.m. (instead of 8 p.m.) for persons aged 16 or over, and at 6.30 p.m. (instead of 6 p.m.) for those under 16, or, alternatively,

(3) The women and young persons may be divided into two sets, in which case the period of employment may begin as in (1) above for the first set and may end as in (2) above for the second set.

(*B*) *Meals and Intervals.*

The periods of employment and intervals for meals and rest may differ from week to week, but where this is permitted the total working hours for persons aged 16 or over may be more than 48 in a week (but not more than a number specified by the District Inspector), provided that they do not average more than 48 a week over two consecutive weeks or over a period which appears reasonable to the Inspector.

(*C*) *Afternoon Spell.*

Where a period of employment ends not later than 7.15 p.m., an afternoon spell of work may be as long as six hours, provided there is a break of at least a quarter of an hour during the spell and the District Inspector is satisfied with the arrangements for refreshment during the break.

(*D*) *Saturday Afternoon or Sunday.*

Work may be allowed provided another day is substituted as the weekly short day or day of rest as the case may be.

(*E*) *Night Work.*

This may be permitted (for women aged 18 or over and *male* young persons aged 16 or over) subject to the following limitations:

(a) not more than six nights in a week;

(b) maximum of 48 hours work a week and nine hours work a night (or ten hours a night if only five nights a week are worked;

(c) period of employment not to exceed 11 hours (or 12 hours if only five nights a week are worked) on any night, and

(d) not to begin before 7 p.m. or end after 8 a.m.

The Order therefore allows a very wide variety of arrangements for staggering hours of work. It will be possible under the Order for District Inspectors of Factories, in appropriate cases, to permit double day shift working by women and young persons *aged 16 or over*, and day and night shift working or three-shift working by women aged 18 or over and *male* young persons aged 16 or over.

Safety Provisions Retained

The Order in no way modifies the safety, health and welfare provisions of the 1937 Act and, except insofar as a certificate of permission issued by a District Inspector of Factories authorises it. The provisions of the Act relating to the hours of work of women and young persons (including the special exceptions provided for in the Act) will continue in force.

It is emphasised that the Order makes no provision for employment of young persons under the age of 16 before 7 a.m. or after 6.30 p.m.: employment of female young persons aged 16 to 18 before 6 a.m. or after 11 p.m., or hours of work of an individual worker to be spread over longer periods of employment than those laid down by the Factories Act, 1937.

* S.R. & O., 1947, No. 1870; published by H.M. Stationary Office. Price: 2d. net; post free 3d.

Atomic Energy Rail Exhibition

AS briefly mentioned in last week's CHEMICAL AGE, the Atomic Scientists' Association, with full co-operation of the Ministry of Supply, is organising a travelling train Exhibition on Atomic Energy which will start at the beginning of November, touring 26 towns in England, Scotland and Wales. The aim of the exhibition will be to give the public the basic facts of atomic energy and explain its implications; its destructive and constructive purposes. The exhibition will be fitted in two coaches.

The first half of the exhibition will deal with the basic principles of atomic energy. These will be illustrated by means of charts, photographs and working models. But, in addition to these, there will be several experiments showing the instruments used by scientists in laboratories for the detection of radio-activity, and the process of splitting uranium atoms. There will also be an experiment showing the production of artificial radio-activity.

In the second part, the application of atomic energy will be shown with models illustrating the chain reaction in uranium, the principles of separation of isotopes and atomic energy piles. The applications of atomic energy to medicine and biological sciences will also be illustrated. The instruments used in the Tracer technique in medicine will be shown.

Chester First

Scientists will be in attendance to answer questions and to give additional explanations. It is planned to organise, at the same time, Atomic Energy Weeks in each town visited, when lectures and film shows will take place. There will be, in collaboration with various local organisations, public meetings, " brain trusts " and conducted parties for schools, etc.

The choice of towns to be visited was dictated largely by train requirements and existing facilities at the various stations. These facts have eliminated a number of towns which were intended to be fitted into the itinerary. The official opening will take place at Liverpool, but the first showing to the public will be at Chester.

The itinerary for the Atomic Energy Exhibition train is as follows:—

November 10-13, L.M.S. Station, Chester, four days; November 14-18, L.M.S. Station, Stoke-on-Trent, five days; November 19-27, L.M.S. Victoria Station, Manchester, nine days; November 29-December 6, L.M.S. Central Station, Blackpool, eight days; December 8-10, L.M.S. Station, Carlisle, three days; December 12-20, L.M.S. St. Enoch Station, Glasgow, nine days; December 22-24, L.M.S. West Station, Dundee, three days; December 29-31, L.N.E. Central Station, Leith, three days.

January 2-6, L.N.E. Waverley Station, Edinburgh, five days; January 8-12, L.N.E. Central Station, Newcastle-on-Tyne, five days; January 14-17, L.N.E. Station, Middlesbrough, four days; January 19-22, L.N.E. Station, York, four days; January 23-28, L.M.S. City South Station, Leeds, six days; January 29-February 3, L.M.S. Station, Sheffield, six days; February 5-7, L.M.S. Station, Derby, three days; February 9-12, L.M.S. Station, Coventry, four days; February 13-17, L.N.E. Victoria Station, Nottingham, five days; February 18-21, L.N.E. Central Station, Leicester, four days; February 23-March 2, G.W. Snow Hill Station, Birmingham, nine days.

March 4-6, G.W. Station, Shrewsbury, three days; March 8-13, G.W. High Street Station, Swansea, six days; March 15-20, G.W. Temple Meads Station, Bristol, six days; March 22-27, G.W. Queen Street Station, Cardiff, six days; March 29-April 3, L.M.S. Station, Oxford, six days; April 5-8, S.R. Station, Reading, four days; April 9-20, G.W. Paddington Station, London, 12 days.

American Wax Shortage

MANUFACTURING chemists in Scotland are currently worried over the prospect that the American dollar situation may lead to a reduction in the supplies of certain raw materials available to the industry. A particular instance of this is that of one Scottish manufacturer who pointed to the virtual elimination of many polishes if American sources of waxes are cut out or controlled by Government action. It is understood that discussions are proceeding between users and the Government departments involved to attempt a continuity of supplies, but there is no optimism that the industry will escape unscathed during the present curtailment of buying. According to this manufacturer, the limitation of wax supplies would lead to a situuation whereby most polishes would be gradually forced off the market. It would be possible to continue liquid and semi-liquid varieties for some considerable time, but even there some deterioration of supplies is inevitable. For the same reason manufacturers foresee a very definite limitation to new developments in the meantime, pending the improvement of the dollar position and some clarification as to supplies and sources of supplies. The situation is more serious in some directions than in others, but all manufacturers drawing supplies from American sources anticipate certain difficulties.

PAINT RESEARCH ASSOCIATION

TO commemorate the 21st anniversary of the foundation of the Research Association of British Paint, Colour and Varnish Manufacturers, an "Open Week" and Exhibition is being held at the Paint Research Station, during the course of which extensions to the present buildings will be formally opened by Sir Edward Appleton in the presence of distinguished visitors. Proceedings commence on September 23 and will last for four days. The programme is as follows:—

Tuesday (September 23) at Teddington*

2.30 p.m., Assembly. 2.45 p.m., Opening of the extensions by Sir Edward Appleton. 3.30 p.m., Address by Prof. H. V. A. Briscoe entitled "Following the Unexpected." 4.15 p.m., Tea.

Wednesday (September 24) in London.

12.15 p.m., Reception. 12.30 p.m., Luncheon at the Connaught Rooms. The Rt. Hon. Col. Walter Elliott will propose the toast of the Research Association.

(At Teddington.)

4.15 p.m., Tea. 2 p.m. to 6 p.m., Laboratories open for visitors.

Thursday (September 25) at Teddington.*

2 p.m., Assembly. 2.30 p.m., Address: Sir Thomas Merton. 3 p.m., Lecture: "Is Copal Varnish an Alkyd?" by Dr. D. A. Sutton. 4.15 p.m., Tea.

Friday (September 26) at Teddington.*

2 p.m., Assembly. 2.30 p.m., Chairman: Sir Charles Darwin, Director, N.P.L. Address: Sir Lawrence Bragg. 3 p.m., Lecture: "Paint and Mathematics," by Dr. G. Herdan. 4.15 p.m., Tea.

* The exhibition will be open these days until 6 p.m.

Coal Strike Halts Industries

A LOSS of some 15,000 tons of steel was reported early this week from Sheffield as a result of the strike in the South Yorkshire coal pits and the consequent reduction of coal supplies.

The managing director of Hadfields, one of Sheffield's largest steel manufacturers employing 5000, said last week-end: "Thousands will be out of work or on short time in a few days if the pit strike is not ended. Before the strike began my firm had two weeks' supply of coal in hand for the winter. Now we have enough for a few days only." Even if the pit dispute ends soon, short-time working in some industries would be inevitable.

As a direct result of the strike, supplies to industrial gas users are being cut to 30 per cent of normal. Two glass bottle manufacturers at Knottingley have been obliged to close and others are likely to do so.

R.I.C. QUESTIONNAIRE

New Register of Fellows

IN response to numerous requests from members, Government Departments and others, the Council of the Royal Institute of Chemistry decided over a year ago to prepare a new Register of Fellows and Associates as soon as the necessary supplies of paper and printing facilities became available. Such a position may be reached during the next few months and preparations have therefore been made to issue all Fellows and Associates with a form on which they may report up-to-date particulars of themselves for inclusion in this Register. The form will be returnable to the Institute as a pre-paid postcard, and the Institute intends to forward these postcards to the printer after any necessary editorial amendment.

The Council has further decided to ask members to make a return of their remunerations. The information provided in 1942 when 72 per cent of Fellows and Associates resident in Great Britain responded to a similar request, has proved of considerable value to members, both in their capacities as employees and as employers, and has, moreover, been of equal value to the Institute when dealing with matters of economic status. During the next few months, subject to paper being available, the Institute hopes to send all Fellows and Associates a circular letter and pre-paid postcard form on which this information may be furnished anonymously. Fellows and Associates will be asked to study the instructions carefully, before replying, in order that the statistical information may be fully representative.

Lever Brothers' Pension Scheme

Lever Brothers and Unilever, Ltd., have announced a new pension scheme embracing the works employees of the two companies, together with those of the following subsidiaries: Van den Berghs and Jurgens, Ltd.; Stork Margarine Works; Prices (Bromborough), Ltd.; and Joseph Crosfield and Sons, Ltd., Warrington. The fund, which replaces an existing provident fund, will confer benefits additional to those of the State insurance plan.

Retirement pensions are payable at 65, while provision is made for widows' and children's pensions. Widows' pensions will be one-half of the full retirement pay of the subscribing member. There will also be dependent pensions in special circumstances. Contributions will be paid jointly by the employee and company, about one-third of the cost being met by the former.

PROPERTIES OF CONCRETE

Report on Ingredients

A TECHNICAL report, for which there has been considerable demand by engineers engaged on concrete construction, is republished today. "Road Research Technical Paper No. 5—The Grading of Aggregates and the Workability of Concrete" (H.M.S.O. Kingsway, London, W.C.2, price 1s. 6d., by post 1s. 8d.) was first published in 1938 but has now been enlarged and slightly amended.

The report describes an investigation into the effect of the ingredients on the properties of concrete; it deals especially with the relations between mix proportions, aggregate shape and grading, and workability. The main part consists of an examination of the effects of the shape and grading of the aggregate and of the mix proportions on the workability of concrete and much valuable data to help engineers in the choice of mix proportions is given. It is shown that while the water-cement ratio is the chief factor that determines the strength of concrete, the water-cement ratio in a given mix is itself largely determined by the grading and type of the aggregate used.

Workability is more precisely defined in this report and is regarded as a property of the concrete alone. A description is given of a method of measuring workability, called the compacting factor test, which overcomes some of the limitations of the slump test.

For the practising engineer the paper provides a good background of knowledge on designing concrete mixes having specified properties. This subject will, however, be dealt with more fully in "Road Note No. 4—The Design of Concrete Mixes," which will be published in two to three months' time.

Electron Jubilee

The Institute of Physics and the Physical Society in collaboration with the Institution of Electrical Engineers is arranging a series of lectures and other functions in London on September 25 and 26 next, to mark the jubilee of the discovery of the electron by J. J. Thomson, while industrial organisations and universities have collaborated with the authorities at the Science Museum, South Kensington in arranging a special exhibition, which will remain open for about three months. The exhibition is designed to show the principles underlying the applications of the many devices in which the electron plays an essential part, and to help the visitor to appreciate the important part these developments play in his daily activities. The exhibits will range from Thomson's original apparatus to the most modern developments, such as the electron microscope; many will be working.

SPEKE PENICILLIN FACTORY

Future Assured

WITH the announcement on September 1 that the penicillin factory at Speke, Liverpool, is to be handed over by the Ministry of Supply to the Distillers' Company, Ltd., on December 1, the future of the factory as the world's largest producer of the drug seems assured.

Its importance will be increased when the Distillers' Company complete the setting-up of a pilot plant for the manufacture of another new drug, streptomycin, the manufacture of which has certain similarities to the manufacture of penicillin.

The Speke factory was constructed by the Ministry of Supply at a cost of £1,125,000 and began production late in 1945. It covers twelve acres and employs nearly 400 people. It has been operated by the Distillers' Company on behalf of the Ministry of Supply.

As far as the production of penicillin is concerned, the Distillers' Company proposes to develop this even further on a commercial basis, maintaining the factory as the principal centre of manufacture for home and export purposes. Output will be increased as much as is possible.

Independent of the Ministry of Supply, the Distillers' Company is setting up a pilot plant for the manufacture of streptomycin, on which clinical tests are now being made as to its efficacy as a meningitis and tuberculosis cure. This plant may be in use by the end of the year.

In January, 1946, 10,000 million units of penicillin were prepared, bottled and tested. Output was trebled a month later, and it is believed that the production rate now exceeds 80,000 million units a month.

Dufay-Chromex and I.C.I.

It is reported that negotiations are in progress between Dufay-Chromex (manufacturers of colour films and cellulose acetate sheeting) and I.C.I. As far as can be judged from observations made by the chairman of the former company at its recent ordinary general meeting, there is no question either of amalgamation or joint endeavours in the commercial field. It is significant, however, that the chairman has remarked that I.C.I. "have one of the most advanced technical staffs in the world," which may well indicate that Dufay-Chromex is anxious to "borrow" I.C.I. technicians possibly with a view to undertaking research work of value to both parties. An I.C.I. representative, when approached by THE CHEMICAL AGE, agreed that conversations were taking place, but declined to disclose their purpose.

OFFICIAL NOTICES

Penicillin Control Removed

CONSEQUENT upon the operation of the Penicillin Act, 1947, on July 18, and the Therapeutic Substances Amendment Regulations, 1947, on August 18, the Minister of Supply has made the Control of Penicillin (No. 3) (Revocation) Order, 1947 (S.R. & O. 1947, No. 1831). This Order, which is effective from August 30, frees penicillin and penicillin preparations from control by the Minister of Supply. As from August 30, 1947, licences granted under the Control of Penicillin (Nos. 1 and 2) Orders, 1946, cease to have effect.

Free Disposal of Magnesium

The Minister of Supply has made an Order (The Control of Magnesium (No. 5) (Revocation) Order, 1947) revoking the Control of Magnesium (No. 4) Order, 1942. The effect of the revocation, which came into force on September 1, is to free the acquisition, disposal, and use of all forms of magnesium and magnesium alloys from licensing and to remove price control.

Gum and Wood Resin

The Board of Trade announces that on and after September 1, 1947, the selling prices of gum and wood resin sold by them through their agents, the United Kingdom Naval Stores Association, Ltd., 46 St. Mary Axe, London, E.C.3, will be reduced as follows:—

Gum Resin	*Per cwt., ex store*	*Wood Resin*	*Per cwt. ex store*
Medium pale ...	56/–	B ...	40/6
B, D, E ...	56/–	FF ...	47/–
F/M ...	59/–	K, M ...	56/–
N, WG ...	60/–	N, WG ...	57/–
WW ...	61/–	WW ...	58/–
WWX, Y ...	61/6	Vinsol ...	48/–
2A, 3A, 4A, 5A ...	62/–	Polymerised resin	65/6
Crystal ...	62/6		

Benzene Duty Exemption

The Treasury has made an Order exempting iso-propyl-benzene (cumene, cumol) from Key Industry Duty for the period beginning September 3 last and ending December 31 next. The Order is entitled "The Safeguarding of Industries" (Exemption) (No. 5) Order, 1947 (S.R. & O. 1947, No. 1848), and is obtainable, price 1d., from H.M. Stationery Office.

Control of Iron and Steel

The Ministry of Supply Control of Iron and Steel (No. 59) Order which came into force on September 3, increases maximum prices of rainwater and soil goods, roping wire and wire ropes. Maximum prices for extra light weight quality screwed and socketted tubing are also established.

CHLORINE LORRY ON FIRE

A LORRY and trailer with a consignment of liquid chlorine in drums and cylinders, said to be bound from Chester to Kentish Town, caught fire on the Barnet by-pass last week. Three local sections of the National Fire Service were called to the scene, and traffic was held up for about half an hour until the fire was brought under control. Although the driver and his mate managed to detach the trailer before the arrival of the N.F.S., and thus prevent the fire from spreading, some of the smaller drums on the lorry burst owing to the heat. The chlorine thus released rendered the firefighters' task more difficult. Special breathing apparatus had to be sent for when a fireman succumbed to the fumes. He was taken to hospital, but was allowed to leave after treatment.

Reports state that the lorry was completely gutted, though some of the larger drums of chlorine resisted the flames and were subsequently salvaged. It is understood that the consignment was destined for a Kentish Town I.C.I. depot, which sent a break-down team to retrieve the trailer and its contents.

Coal Slumps Again

A REDUCTION of approximately 200,000 tons by comparison with the same period of 1946 is revealed by the Ministry of Fuel statement on Tuesday of weekly coal output in the previous week. The total of saleable coal from the mines was 3,414,200 tons. The relatively small output of opencast coal again improved to 224,100 tons, against 201,700 tons a year ago. The combined totals, 3,638,300 tons, was 361,700 tons below the Government's weekly target of 4 million. Of this 247,550 tons were lost by the widespread strikes in the Yorkshire pits, where on Tuesday 15 or the 47 idle pits elected to return to work.

Cass Technical Institute

Chemical Courses in 1947-48 Session

Afternoon and evening courses arranged by the Sir John Cass Technical Institute for its 1947-48 session include the following:

"Chemicals from Petroleum," by Dr. M. A. Matthews; "Industrial Law," by Mr. Eric Walker; "Advanced Organic Chemistry," by Mr. A. G. Lidstone; "General Technology of Petroleum" (various lecturers); "Patents and Industrial Design Protection," by Mr. Eric Walker; "Spectroscopic Analysis," by Dr. S. Judd Lewis and Dr. D. W. Wilson; "Electrochemical Analysis," by Dr. A. J. Lindsey and Dr. J. V. Westwood; and "Microchemical Analysis," by Dr. D. W Wilson.

RIVER POLLUTION

Effects of Chemical Works on Fisheries

THE recent report on the state of pollution in English salmon rivers compiled for the British Field Sports Society is no creditable reflection upon the part chemical works have played in the reduction of food supplies from fisheries. Although it might be added that several firms have made serious efforts to check this fouling of salmon rivers, the fact still remains that several hundred tons of edible freshwater fish are lost every year through careless or indifferent disposal of industrial effluents into rivers. The situation is far from being a new one. But chemical works are not the only culprits, sewage works, paper mills, artificial silk works, food canning (tomato) factories and sugar beet factories often being equal or even worse offenders. Although the position has been well known for years to those closely connected with the fisheries, there are many city industrialists who are either unmindful of or oblivious to the dangers.

The River Mersey, once one of the biggest salmon rivers in the country, now receives upwards of 40,000,000 gallons of crude sewage every day—and has no fishery. Along the 150 miles of the English North-West coast from Liverpool to Barrow, a minimum of 200,000 gallons of crude sewage is discharged every mile every day, or about forty large buckets full every yard daily. The shellfish cannot be sold for human food unless specially treated. The Lancashire coast has eleven big mussel beds—three in the Ribble estuary, four in the Wyre, one in the Lune and a large one in Morecambe Bay, in addition to two in the Duddon estuary north of Barrow. They yield over 200 tons of food annually, but many are often out of action through river pollution. British salmon rivers can yield about 6000 tons of salmon food annually, but even with only a slight improvement in their pollution and a check of the growing menace there would be an immediate increase of 1 per cent or the annual addition of 50 tons of food to the national larder.

Damage on Tyneside

To review the effect of chemical works upon the main river fisheries and sea fisheries, with an eye to considering effective remedies, reference must first be made to the Tyne which once produced nearly 130,000 salmon a year, but which now yields about one-thirtieth of that total, a loss of some 1500 tons of food. In 1933, 283 dead salmon smolts were taken out of the polluted river. 30,000,000 gallons of entirely untreated sewage a day, or 10,950,000,000 gallons a year, are deposited into the river mouth by Tyneside's industrial towns. There are 268 sewage outfalls between Wylam and the sea, although the tide normally runs at 2 m.p.h. thus preventing the sewage from being cleared at a single tide. Through the increasing extraction of freshwater upriver from Newcastle and Gateshead (6,500,000,000 gallons), and also the I.C.I. works at Prudhoe (57,000,000 gallons), the pollution of estuary water has increased in density. A Ministry of Agriculture investigation found that for five consecutive June days there was no oxygen in the water from Ryton to Bill Quay. Tar acids from coke ovens and waters from coalmines are instanced as other causes of pollution. Because the tidal part has not been declared a "stream," legal action cannot be taken under the 1876 Rivers Pollution Prevention Act.

Trent a Dead River

The Tees now yields about 1600 salmon a year compared with its little neighbour the Esk which produces three times as much salmon. Even this small total is rapidly dwindling from Teesmouth industrial effluents. The Trent, with waste from the Potteries, and the Birmingham and Leicester areas all making their contributions, sees but a score of salmon struggling into its estuary waters but unable to proceed further. Until the 19th Century, the Trent was one of the country's net-fishing commercial salmon rivers, yielding over 3000 salmon a year; the industrial efforts of the first world war reduced this to 30. Most of its pollution is derived from its tributaries, the Foulea Brook from Stoke-on-Trent, the Churnet from Leek's mills, and the Tame from the North Midlands. The effluent from a Leek dye works is said to be an organic pollution that uses up the oxygen in the water, and for seven miles below this there is a complete absence of piscatorial and plant life. At Froghall and Oakamoor, pollution comes from the effluents of copper-plate manufacturers in the form of washing water used on the metal after sulphuric acid treatment, so that the water contains copper salts; for eleven miles to the Dove and for seven or eight miles below it, life is extinct. Foulea Brook is reported fouled by the untreated phenols and tar acid effluents of the four Pottery town's gas works which stain the stream deep red-brown. The effluent from Birmingham Sewage Works is declared to be purer than the water of the Tame, the worst of the Trent tributaries, again fouled with phenols and tar acids from coke

ovens and gas works, plus heavy metallic salts from engineering works in the area to the north of Birmingham. The ammonia content of this stream has been found to be well over 1 part per 100,000 due to the metal acids destroying the bacteria which normally break down organic matter to neutral salts, thus suspending the ordinary self-purification of a river.

Effluents and Sewage

The commercial salmon yield from the Severn has fallen from over 24,000 fish to 340, and may well cease altogether like that from the Thames and the Mersey. The latter suffers mostly from untreated sewage from upper villages, from towns like Welshpool and from a beet-sugar factory near Shrewsbury where washing waters even after treatment and settlement encourage the growth of "sewage fungus" which extracts the oxygen. The management of this factory is making a real effort to overcome this trouble, which is common to all beet-sugar factories. The Stour brings into the Severn the Kidderminster factory effluents, the worst being untreated washing water from acid pickling in galvanising works. The Bard of Avon might turn in his grave if he knew that his erstwhile beautiful river receives, via the Sowe, 11,000,000 gallons of Coventry sewage a day, having already tried to digest 3,000,000 gallons a day from Rugby where the slow-flowing river has only 2,000,000 gallons of water a day, whereas such an amount of sewage requires twenty parts of oxygen per million. Formerly untreated sewage from Redditch, which came in via the Arrow, still leaves its effect, so long and slow is the recovery even when an up-to-date plant is installed. The poisonous effluent from a chromium still producer is quoted as a current trouble; but this raises a very difficult problem because it cannot be put into a public sewer because it would destroy essential bacteria specifically put there by sewage engineers. However, a purification plant has now been installed. The City of Gloucester too, turns all its untreated sewage into the tidal reaches, although it cannot get away at a single tide.

The Anglo-Welsh Dee is not without its troubles. For many years it is reported to have had a high mortality rate amongst its salmon population caused by the synthetic phenolic effluents from the chemical works at Cefn Mawr despite their spending £80,000 on preventives. In 1939 the accidental discharge of untreated sulphite liquor killed 1000 salmon. Serious pollution comes also from the artificial silk works and the paper mills at Flint and Greenfield, while the Queensferry sewage works, which is overloaded and out of date adds to the pollution. Tidal pollution in the Dee estuary has caused the sale of shellfish for human consumption to be banned.

With regard to the Cumberland Eden, trouble is reported by the accidental leak of spent sulphuric acid from a cellophane factory, normally neutralised and fed into a sewer. The Lancashire Ribble has had a long struggle against pollution. Its tributaries the Calder—the Darwen and the Douglas—are heavily fouled by East Lancashire towns. Once yielding 15,000 salmon a year, it now produces less than 1000, but has a stock over 3000. During the war, additional pollution decreased the stock again. The 5,000,000 gallons of sewage leaving Preston sewage plant daily need 20 parts of oxygen per 100,000, whereas 2 parts per 100,000 is most the river can provide, although the 120,600,000 gallon river flow per day overcomes this threat. Its Calder tributary is so fouled as to have lost its normal powers of self-purification owing to an unduly high chlorine content from the Colne brook which contains calico printing and dye-works effluents from Accrington via the Hindburn Brook, from tar-distillers and chemical works at Tinker Brook, where it comes out of the open settlement tanks and caustic effluent from Holt Mill Bridge paper mill.

Estuary Now Barren

The Lancashire Lune where salmon yield has fallen to little more than 2000, suffers from the bacterially untreated sewage and trade waste (tar acids, sulphuric acid and phenols) of Lancaster to the extent of 12,000,000 gallons a day. Hot water condensers at Sherton Weir add to the estuary's difficulty in coping with this. Further north, another salmon river, the Wyre, suffered during the war from sulphuric acid from an estuary I.C.I. works at Burn Naze, making D.D.T., together with spent acid from a sister factory on the Ribble which was run over in tank-wagons and put into the factory's waste pipe. The estuary was reported almost barren by the Lancashire and Western Sea Fisheries. In 1945 as much as 122 tons per week and an average of 74 tons a week were discharged into the estuary, which has an average river flow of 20,000 gallons per minute. The cod and eel fisheries have been badly poisoned by the acid. The wartime elver-fishery established in the estuary in 1941 to augment the national food supply dropped its yield in five years from 620 lb. in 1942 to 50 lb. in 1946. When the acid was put into the estuary in 1944, the annual yield fell from the previous year's 590 lb. to 82 lb. within 12 months. Space considerations prevent further examples of sea fisheries and

(*Contd. on page 370*)

CHEMICAL PORCELAIN

by H. SEYMOUR

THE chemical industry, which includes everything from the refining of petroleum to foodstuffs, is always on the alert for new materials which are unaffected by the solids or liquids being processed, so that not only is the resulting product uncontaminated by the vessels through which it has passed, but the vessels, piping and other equipment have a much longer life. Metals, both pure and alloyed, are giving excellent service; so are the various forms of glass. But a material which has grown rapidly in popularity through the war is the so-called chemical porcelain. This is, in fact, a dense hard potassium aluminium silicate of close-grained homogeneous body.

As a material, chemical porcelain is inert to the action of most chemicals. The solid porcelain body, glazed or unglazed, is unaffected by all acids, except hydrofluoric, and is relatively resistant to alkalis. It is pure, without a detectable trace of iron. Its absolute non-porosity and freedom from contamination, along with its mechanical strength and resistance to thermal shock, qualify it for a variety of applications in industrial use.

The glaze, generally pure white and glass-smooth, is sanitary in appearance and cleans with a wipe of a cloth. This glaze imparts some surface strength, but more important, makes for free and easy flow of material and clean surfaces. However, with or without the glaze, the porcelain is strong, acid-proof and non-porous. Its dense, homogeneous body, without blebs or voids, permits accurate grinding and polishing. Perfectly finished surfaces—for pipe ends, valve stems and seats, bearing surfaces, etc.—are attained in routine production.

Loss Comparison

In a piece-for-piece comparison, chemical porcelain is more expensive than some corrosion-resisting materials, but much less expensive than others. To be significant, however, a cost analysis of any industrial installation must consider, as well as initial cost, such factors as maintenance, length of life and quality of product. For the purposes to which it is suited, chemical porcelain often offers the lowest overall cost of any material. Porcelain, being non-porous, can never drink up liquids and subsequently exude them to contaminate later batches; its absolute freedom from iron is a further guarantee of purity of product; for the handling of most liquids it is completely corrosion-free, so that it never needs replacement or even shut-down for cleaning. For any process in which the corrosion-resisting material being used shows any sign of deterioration, chemical porcelain deserves thorough investigation.

Chemical porcelain is a compound, principally of plastic clay, kaolin, quartz, feldspar and certain other special property minerals. Ingredients in proper proportion, with the addition of water, are thoroughly mixed to produce "slip," a uniform fine slurry. The slip passes through a vacuum process, and is filter-pressed into flat cakes. The clay then goes to mixing machines, where it is worked into a fine-grained homogeneous plastic body, stress-free and without voids, blebs or laminations. In this state it is delivered to various departments for forming and shaping, by turning, plunging, jiggering or throwing. Complex shapes (such as the valve body) are cast. For this process, liquid slip goes directly into high-absorption plaster moulds. Both plastic-formed and cast bodies are dried in rooms with special humidity and temperature control. Carefully regulated drying is essential to get a tight, close-grained body.

Glazing

Except for surfaces where pieces are supported during firing, or those subsequently to be ground, pieces are usually glazed over all surfaces. This is a preliminary operation, taking place before the pieces go into the kiln. The glaze is a mixture, similar to the body but containing a higher proportion of fluxes, which completely fuses to a glassy smoothness with the body during vitrification, and will not subsequently chip, craze or crack away. The thermal expansion coefficient of the glaze has been carefully adjusted to a point where it is slightly lower than that of the body. As the piece cools the glaze goes into compression with respect to the body and imparts extra strength and heat shock resistance.

Owing to the nature of processing and high firing temperature, dimensions of porcelain pieces may vary slightly. There is approximately a 40 per cent volumetric shrinkage between plastic clay and the fired porcelain. This shrinkage must be compensated for. High firing temperature may cause some warping of pieces through the kiln. As an average, most dimensions can be maintained within about ± 3 per cent.

For closer dimensions or where surfaces must be finished for gasketing or close fit to other parts, fired porcelain is ground.

This work is done in grinding machines using silicon carbide or diamond wheels. Ground gasket surfaces are smooth, flat, and true.

If a still finer finish is required, ground surfaces can be further lapped and polished to a fine mirror finish. For special applications where purity or corrosion make it desirable to eliminate the gasket entirely, pipe ends may be polished optically smooth and connected without gaskets. This is a special operation and is recommended only for vacuum and low pressure applications.

Standard metal flanging methods are not practicable for flanging ceramics, porcelain, stoneware, glass, high silicon iron, carbon and other acid-resistant construction materials. Special flanging methods are required because the physical properties of these materials differ so widely from metal.

The latest flanging method utilises a cemented flanged joint. Flanges are cast of iron in one piece and undercut inside to form sawtooth rings which firmly grip the banding cement. These flanges are permanently cemented to the porcelain pipe or body of uniform wall thickness. A bank of rough sand is fused into the glaze of the porcelain body, thus forming thousands of protruding points which grip the cement. (Neat Portland cement is used for this banding unless special acid-proof cements are specified.) As pressure is drawn up on the flange, the load is distributed uniformily over the porcelain body. Sound in theory, this method has been thoroughly proved in service. Many installations employing these flanged joints have been made, yet no case has been reported of porcelain breakage from non-uniform loading of the flanges or weakness at the point of flange bearing.

Assembly Points

Standard chemical porcelain pipe, valve and fitting ends are equipped with flanges and bolts ready for assembly. Standard flanges consist of one-piece iron castings, drilled to accommodate the bolts, and finished in acid-resisting paint. These specially designed and machined castings are permanently attached to the porcelain body by the banding method. Neither cement nor flange is in direct contact with the chemicals being handled. However, for certain corrosive atmospheric conditions special alloy flanges and acid-proof cement are used.

Chemical porcelain angle, block and flush type assemblies follow the same general construction details. The body is usually a single porcelain casting; stuffing boxes, seats and gasket ends are lathe-ground. Porcelain plugs are also lathe-ground and then further lapped and polished to a fine satin finish. The plug is then lapped into the seat of the porcelain body and this seal is tested to about 150-pound hydrostatic pressure before shipment.

Many stuffing boxes contain a double set of packing rings of blue asbestos treated with graphite and impregnated with oil. The first set of packing rings are in direct contact with liquid being handled and, of course, takes the greatest punishment. Under severe conditions this packing may gradually dry out and allow acid to work up in the stuffing box. This gradual seepage will hit the porcelain lantern ring and drip off through the side drain nipple. The second set of packing rings will always be at atmospheric pressure and prevent the acid from reaching the outside hardware. When seepage at the drain nipple is detected, the stuffing box can be tightened down or repacked as necessary. Valves can be repacked in the field by simply retracting the compression plate or packing gland and replacing the packing rings.

Porcelain Valves

Some porcelain valves include an ingenious spring arrangement which offers two important advantages. When the valve is turned closed, the porcelain plug will first contact the porcelain seat. As additional pressure is exerted on the hand wheel this pressure is absorbed by a set of spring washers. This spring cushion provides against overloading the porcelain, and locks the plug closed; it also avoids loosening occurring from mechanical vibration or temperature strain.

Processing kettles, stills and tanks are usually made with a bottom drain outlet. A cavity is formed which collects unreacted liquids or solids at the outlet and these interfere with drainage. Installing a chemical porcelain flush valve eliminates this cavity, makes for thorough agitation and trouble-free drainage. The assembly includes a stuffing box and seating spring arrangement as used in standard Y and angle valves. Built for operating pressure up to 50 lb. per sq. in., these valves are generally tested at 125 lb. per sq. in. before shipment. The valve assembly is gasketed and bolted securely to the outlet flange and the neck can be caulked or cemented, thus filling the outlet cavity.

A primary advantage of chemical porcelain is the easy adaptability of the manufacturing processes which produce it. As a result, it lends itself readily to use in a wide variety of applications. For many of these applications, the porcelain pieces must be designed and built to special order because of small runs or other limiting factors. A few of these special shapes

(*Continued on page 364*)

MODERN COAL GASIFICATION METHODS*

by DR. D. T. A. TOWNEND

THE value of any gas-making process depends upon whether the gas produced is to be used for energy or heat requirements, or for a specific chemical industry. In this country gas is used mainly for the former purpose, except in special instances such as in hydrogenation plant. Also, in considering the newer developments on the Continent, one must not be unduly influenced by the pre-war German economy, which had self-sufficiency as its aim. Then, as pointed out by Major Gordon in his lecture on "The Production of Petroleum by Synthetic Methods," most of the German processes have been effected with lignite as the material undergoing gasification.

Typical Fuels

In this address I propose to relate our interest in the newer processes to British practice; and any process has therefore to be carefully assessed in relation to British coals. Table 1 illustrates the properties of typical solid fuels in the wood-to-anthracite series. This country has been well endowed with black bituminous coals in varieties such that there has been an abundance for all the industrial uses built up during the Industrial Revolution. The German solid fuel resourses are roughly half lignites and half black coals and, as will be stressed later, most of the newer gasification processes have emerged from the need to utilise lignites, a material most unsuitable for normal carbonisation practice. It will be observed from the ultimate analyses that, whereas lignite contains 70 per cent of carbon and 23 per cent of oxygen, gas coal contains 86 per cent and 6 per cent respectively. Then, while a lignite liberates 50 per cent of its weight as volatiles, the black coal liberates, say, 25-30 per cent, and the inherent water content of a lignite is some 50 per cent, compared with 2 per cent in a bituminous coal. It may well be that our supplies of bituminous coals suitable for most industrial purposes, have placed us behind in research. They have met our needs—and it is, therefore, rather paradoxical that any advantages available from the newer gasification processes have arisen from the need to exploit inferior fuel which, being non-caking and reactive, is admirably suited to them. These facts should not deter us from close investigation of the German methods because, although they may not easily be adaptable to our own coals, it has to be remembered that not less than 40 per cent of the world's reserve of coal is in the form of lignite.

In the years between the two wars, there was an increasing tendency in this country to use more gas, either from gas or coke-oven plant. The reasons for this are obvious: gas offers a better degree of control over the composition of furnace atmospheres and furnace temperatures; high thermal efficiency in use; absence of smoke and ash; flexibility; and gas is more easily distributed. There is, indeed, a general case for increased production of cheap gas in this country; but, however gas is made, an expenditure of energy is necessary, and this must be balanced either by the greater efficiency gained by its use, or by the use of the coke produced if carbonisation is concerned, or by the value of by-products yielded in the process, or lastly by the value of the gas used as a source of chemical synthesis.

TABLE 1

		Wood	Peat	Lignite	Bituminous Coals				Semi-Bituminous Coals	Anthracite
					I	II	III	IV		
Moisture content as found ...		20	93	50	10	5	2	2	1	1
Proximate Analysis—(dry fuel)										
Volatile matter ...		80	65	50	40	35	30	25	18	4
Ash		Trace	5	5	5	5	5	5	4	3
Ultimate Analysis—										
(dry, ash-free fuel)	C	50.0	57.5	70.0	77.0	82.0	86.0	88.0	90.5	94.0
	H	6.0	5.5	5.0	5.5	6.0	5.5	5.0	4.5	3.0
	N and S	1.0	2.0	2.0	2.5	2.5	2.5	2.5	2.0	1.5
	O	43.0	35.0	23.0	15.0	9.5	6.0	4.5	3.0	1.5

New Methods

It is well recognised to-day that a long distance fuel policy is necessary. Pending any large-scale developments, the short distance policy calls for greater efficiency in the use of the large amount of coal burnt in the

* Given at the Institute of Chemistry's Symposium on "Coal, Petroleum and their Newer Derivatives," at St. Andrews, July, 1947.

raw state, e.g., of the present target production of 200 million tons, 45 are burnt on the domestic hearth, more than 60 under boilers, and probably 20 in furnaces; and one must bear in mind newer developments, such as the down-jet furnace and the extended use of pulverised fuel which should enable raw coal to be burnt with high efficiency. At present 21 million tons of coal are used in the gas industry primarily for gas manufacture, and some 20.5 million tons in the coke-oven industry, primarily for metallurgical coke manufacture.

I have stressed this perspective at the outset, so that any novelty of the newer gasification methods, however attractive, should not obscure the present situation in this country. This said, we should undertake research into the fields under discussion as energetically as our resources will allow.

The Gasification Process

There are two main methods of producing gaseous fuels: carbonisation and gasification. When coal is carbonised, the products are obtained in the solid, liquid and gaseous states in amounts and chemical characteristics depending on the temperature employed. The coal is subjected to heat treatment within a vessel, the source of heat being applied externally; and having in mind that both coal and refractory materials have low heat conductivity, the process is accompanied by a certain loss of fuel energy. Good practice to-day may attain an efficiency of 75 per cent, and it may be doubted whether by current methods this is likely greatly to be exceeded.

Methods of internal heating, therefore, offer attraction owing to the better conditions of heat transfer, and this is achieved in gasification processes by the internal oxidation of part of the charge itself. At present coal or coke may be gasified completely by means of the producer gas reaction, and coke (sometimes coal) by means of the water gas reaction, which proceed according to the equations shown in Table 2. (1) is the main producer-gas reaction, (2) and (3) are the two steam reactions with carbon. While reaction (2) is predominant at temperatures at 1000°C. and over, at temperatures of 500-600°C., reaction (3) predominates; and at intermediate temperatures both CO and CO_2 are formed. It is usual in producer-gas practice to effect gasification by "blowing" the fuel with an air-steam blast so that both the exothermic oxidation and endothermic reduction reactions proceed continuously. If raw coal is used, gasification is accompanied by its partial distillation, thus resulting in a producer-gas of somewhat increased calorific value. In addition to the main reactions, consideration has to be given to the water-gas equilibrium (4) and, when pressure is employed, to the equilibria involving methane synthesis, *e.g.*, (5).

TABLE 2

PRODUCER GAS REACTION

(1) $C + \frac{1}{2}(O_2 + 4N_2) = CO + 2N_2 + 29$ KCU

WATER GAS REACTION

(2) $C + H_2O = CO + H_2 - 29$ KCU

(3) $C + 2H_2O = CO_2 + 2H_2 - 19$ KCU

WATER GAS EQUILIBRIUM

(4) $CO + OH_2 \rightleftharpoons CO_2 + H_2 + 10$ KCU

LURGI REACTION (PRESSURE)

(5) $CO + 3H_2 \ CH_4 + \rightleftharpoons H_2O + 58$ KCU

In general, owing to its high nitrogen content (upwards of 50 per cent), producer gas is of too low a grade to permit of economic distribution widely. In the manufacture of water gas, the difficulty of nitrogen dilution is avoided by alternating the air "blow" with a separate steam "run" which gives the "make," thus enabling the production of a higher grade gas; this, however, is achieved at the sacrifice of a proportion of the available heat in the fuel, the loss being in the potential heat of the blow gases. Possible improvements in the efficiency of producer gas practice can be effected by (i) heat recovery from the hot gases and return to the plant, (ii) maintaining as low an oxygen-steam ratio as possible, and (iii) reducing other heat losses from the system. Greater efficiency is obtained in the water gas process by using waste heat for the thermal decomposition of gas oil leading to the production of carburetted water gas, but a further draw-back is the necessity to use coke, as this involves the separate processes of carbonisation and gasification, each accompanied by thermal loss. For this reason attempts have been made to combine both carbonisation by waste heat and gasification in the same process as in the Tully and Broadhead systems.

Three Processes

As indicated, gasification processes have the advantage of internal heating, but methods are necessary whereby fuel can be gasified in the raw state while at the same time avoiding a high nitrogen content in the gas produced, coupled with high conversion efficiency. Close attention has been given to the matter during the past twenty years in Germany for a number of reasons—principally (i) the need to utilise brown coals and lignites which cannot in any event be carbonised, (ii) the need for synthesis gas (H_2-CO mixtures) for the production of liquid fuels and chemicals, and (iii) the availability of oxygen produced by more efficient methods.

I will confine this discussion to the use of O_2 (or O_2 in enriched air)—steam blasts, the typical processes being (a) the Lurgi-

Drawe operating under pressure at the lowest reaction temperature consistent with reactivity at 900-1000°C., (b) the Winkler operating at 1000°C. with a "boiling" bed at atmospheric pressure, and (c) the Leuna-type and Thyssen-Galoczy slagging producers operating at a temperature as high as 1600°C. with consequent removal of the ash in the form of a slag.

Other German developments are concerned with the use of either externally-heated reaction chambers recovering waste heat, or with the use of internal heating by a recirculation of hot gases.

First Studies

When oxygen is used in place of air, the blow and run operations can be combined by an oxygen-steam blast; this is the basis of the three processes enumerated. In this connection it is of great interest to note that the first recorded consideration of the possibility was a discussion by Hodsman and Cobb at Leeds University contributed to the Institution of Gas Engineers in 1921. These authors considered that internal carbonisation by oxygen alone would be unsatisfactory and that the hot gaseous products of combustion of a portion of the coke at the bottom of, say, a vertical retort would not be a suitable vehicle for the transfer of heat to the rest of the coke in order to complete the distillation of the coal; and further, if all the coke were sufficiently heated, it would have to be discharged at a temperature too high to be economical or practical in a continuous process. Hodsman and Cobb formed the opinion, therefore, that for a successful process to work continuously, internal carbonisation must be accompanied to some extent by a gasification process with steam, by which means heat would be extracted from the coke and a supply of water gas provided. From calculations they made at the time, it was concluded that inevitable thermal losses in either carbonisation or complete gasification of coal with steam and oxygen would be relatively small and the thermal efficiency correspondingly high. And carbonisation with steaming would probably enable nearly one-third of the heat energy of the coal to be transposed into gas containing a small proportion of inerts and still leaving half of the original coal or coke. Were gasification taken to completion after allowing for the steam, 90 per cent of the heat energy of the coal could be recovered, 86 per cent in the form of gas of 352 B.Th.U./cu. ft. These assumptions were later tested by Vandaveer and Parr; but unfortunately only a small-scale generator was employed using either oxygen alone or a 50/50 oxygen-steam mixture. The tests were unsuccessful owing to the fall in temperature of the bed, with consequent decrease in gas quality.

An excellent general account of this field, together with the early German experiments which followed, was given by H. C. Millett, then working at Leeds University under the Joint Research Committee of Leeds University and the Institution of Gas Engineers, in the *Journal of the Institute of Fuel*, Vol. 10, 1936, p. 15; and his paper is well worthy of reference by anyone specially interested. A report of the first German experiments was published by Drawe in 1927. The trials were made with lignite briquettes, having in mind appreciation that their high volatile content would reduce the oxygen required; also, in order to obtain maximum steam decomposition, a deep fuel bed was employed. When "blowing" with a mixture containing a steam-oxygen ratio of 2.25:1 gas of gross calorific value 325 B.Th.U./cu. ft. was obtained without any sign of ash fusion, although these results were determined by the limited supply of oxygen available. Little further immediate progress appears to have been made, no doubt on account of the cost of oxygen relative to the calorific value of the gas obtained. The interest of the British Gas Industry was soon aroused, however, when accounts reached this country of experiments in Germany by the Lurgi Gesellschaft which indicated that when gasification was effected with a steam-oxygen blast at pressures of 20-30 atmospheres, a gas of calorific value comparable with that of town's gas was obtained after the removal of carbon dioxide. This was coupled with the development of the Linde Frankl process for oxygen production which greatly reduces its cost.

The development of the Lurgi process in Germany was at that time of particular importance to that country because of its large lignite deposits, having regard to its post-World War I economy. Prior to 1914, gas-making coals had been available in the Ruhr Valley, Silesia, and in the Saar Valley, but much of the supplies for Northern Germany had been obtained from British sources. Under the Versailles Treaty, however, Germany lost the Saar coalfields, and monetary problems precluded the purchase of coal from abroad. The exploitation of the lignite deposits, therefore, became a major necessity.

Lignite Problems

While lignite can be gasified easily by established processes on account of its non-caking characteristics, it does not lend itself to treatment by carbonisation, and while the synthesis of methane by means of the reaction $CO + 3H_2 = CH_4 + H_2O$ had previously been proposed as a means of subsequently stepping up calorific value, the difficulty of finding a catalyst which would maintain its reactivity with such commercial gases had hindered progress. None the less, the incorporation of the synthesis reaction

held attractions, an important one being that the employment of pressures above atmospheric would increase the yield of methane and still further enhance the calorific value of the product. This said, it was impracticable to adapt the water gas process to pressure working and the Lurgi firm was quick to appreciate the possibility of a gasification process employing a steam oxygen blast under pressure, evidently with the hope that the lignite residue would itself sufficiently catalyse the water gas conversion.

Small scale experiments at once established the method, whether the fuel were lignite, anthracite or semi-coke, and experiments at 1 and 18 atmospheres respectively increased the percentage of methane in the crude gas using semi-coke from 1.8 to 13.3 per cent, or from 2.35 to 19.8 per cent in the purified gas. The most interesting feature of this work, however, was the consistency of the results, irrespective of the fuel employed. Apart from its effect on the yield of methane, pressure also offered other important advantages, not least being the ability readily to remove carbon dioxide merely by scrubbing with water, easier purification of the gas from H_2S and reducing the ground space occupied by the plant.

Subsequently, in 1936, a working-size plant was erected at Zittau, using two generators capable of an output, using lignite as a fuel, of 700,000 cu. ft./day. An interesting feature was that in spite of the high output obtained, the fuel bed was maintained below the ash fusion temperature with consequent avoidance of clinkering troubles and it was thus possible to incorporate a fire-brick lining inside a water jacket, the amount of heat passing through this water jacket, being comparatively small. When gasifying at a pressure of 20 atmospheres, the calorific value reached a figure of 445-480 B.Th.U./cu. ft., employing oxygen of 90 per cent purity. Moreover, it was found possible to distribute the supply over a distance of 12 miles without the necessity for special holder capacity.

Experimental Work at Leeds University

The original generators were 1.15 meters in diameter, each producing 15,000 cu. meters of gas/day. Later, during the war, in 1940, a larger installation was erected at Böhlen near Leipzig, comprising ten generators, each 2.5 meters in diameter and producing an actual output of 150 million meters/day which was supplied to the Leipzig-Magdeburg gas grid. A third plant was also erected at Brüx, Czechoslovakia, with an output of 80 million cu. meters/day. This plant was erected for the supply of synthesis gas for the nearby Fischer-Tropsch process.

As already indicated, the early Lurgi experiments had attracted the attention of the British Gas Industry, and a fundamental investigation into the process was at once initiated at Leeds University by Dr. F. J. Dent under the Joint Research Committee of Leeds University and the Institution of Gas Engineers (now the Gas Research Board), Dr. E. V. Evans being its chairman at the time. The Lurgi method would have obvious attractions in this country as a means of employing coals other than gas-making coals. A major issue was the extent to which bituminous coals would supply a suitable reaction bed. The early experiments, however, were carried out with semi cokes and were divided into two series, the one being concerned with the initial reaction between coke and steam under pressure, and the other with the conversion of the products of this reaction into methane.

Direct Production of Methane

The reactivity of the semi coke was found to be of importance with both reactions and a likely economy in oxygen consumption was indicated either by pre-heating the supply or by treating the semi cokes with alkali. The high yields of methane secured by operating under pressure were also at once established and a matter of great interest was that the composition of the gaseous products indicated that equilibrium was rapidly established in all the well-known reversible systems participating. But far the most striking observation was that methane formation did not depend upon the synthesis from carbon monoxide and hydrogen but upon direct hydrogenation of the coal substance, according to the reaction $C + 2H_2 = CH_4$, a process obviously responding to pressure. At 900°C. the rate of hydrogenation was very rapid and it was possible completely to gasify the fuel; interesting also was the observation that aromatic hydrocarbons such as benzene, anthracene and xylene were all as easily hydrogenated to methane at the temperatures in question. Subsequent experiments in wider reaction fields gave rise to another finding of paramount importance, namely that on the attainment of an adequate pressure, the hydrogenation reaction, being strongly exothermic, can be autogenously propagated through a cold fuel bed provided an adequate initiating temperature of the order of 500°C., had been applied locally. Following the autogenous passage of this reaction through the bed, a highly reactive residue was left, all sulphur was converted into H_2S and an encouraging yield of liquid hydrogenated products resulted. During the last few years the work has proceeded to the semi-technical scale, large reaction vessels being employed, and further information is accruing.

(To be continued)

I.G. FARBEN'S POST-WAR ACTIVITIES

Reports from the Zones

WHILE the Nuremberg trial is opening against 21 directors and executives of the former I.G. Farbenindustrie combine for their participation in war crimes, available information about the future of the works, factories and laboratories of the dye trust is still inconclusive. Decentralisation is the announced aim in all four occupation zones, but little definite news has been released about its actual progress.

According to the U.S. Military Government, 59 I.G. Farben works have been destroyed either in the course of war or under orders of the Allied Committee supervising the elimination of Germany's war potential, while 62 works have been earmarked for reparations. These two groups of I.G. Farben factories employed 104,000 and 134,000 persons respectively when last in operation before the close of the war, and do not include works located east of the Oder-Neisse line and thus now under Polish control.

Of more than 500 separate I.G. Farben units left after destruction and dismantlement, most are to be liquidated, while the remainder (about 200) are to continue in operation as independent undertakings. In the U.S. zone the previous production programme is to continue at 60 units, though, of course, the manufacture of warfare requisites will be forbidden. The most important works are Badische Anilin und Sodafabriken, with their main establishment at Ludwigshafen.

British and Soviet Zones

The most important successor to the I.G. Farben legacy in the British zone is Farbenfabriken Bayer. This company comprises the chemical works in the Lower Rhineland region, including factories at Leverkusen, Wuppertal-Elberfeld, Uerdingen and Dormagen. All these works, like those in the U.S. zone, have been suffering from low production due to fuel shortages and transport difficulties. At Leverkusen, work was brought to a complete standstill for several weeks from the middle of June onwards owing to lack of fuel. After the stoppage, these works were given fuel priority.

In the Soviet zone, several former I.G. Farben works have from time to time been reported to be in large-scale production. The Leuna plant is making a substantial contribution to the fertiliser supplies for the eastern zone, and coal-oil production has been in progress—at least temporarily. No other information is obtainable as to the nature of the products from Leuna, nor is it possible to ascertain their destination. Some of the most important I.G. Farben undertakings in the eastern zone, including those at Bitterfeld and Wolfen, have been converted into Soviet Aktiengesellschaften, operated under the direct control of the Soviet Military Administration.

Soviet corporations have been formed for the rubber industry (capital, 500,000,000 roubles), for mineral fertilisers (400,000,000 roubles), for alkalis (210,000,000 roubles), for photo-chemicals (200,000,000 roubles), for dyestuffs (120,000,000 roubles) and for plastics (30,000,000 roubles). These corporations are largely concerned with the operation of the former I.G. Farben works at Schkopau, Luena, Bitterfeld, Merseburg and Wolfen. Together, they account for three-quarters of the total capital of such newly registered Soviet Aktiengesellschaften in the eastern zone of Germany.

Trend to the East

When it was announced some months ago that a number of factories and mines were to be transferred to the German-staffed Governments of the Laender, the list did not include any important I.G. Farben works. It would thus appear that the Soviet authorities have so far retained direct control over these factories. No official information is available about the removal of I.G. Farben plant for reparations from the eastern zone.

Most of the big I.G. Farben factories were originally located in the western parts of Germany, especially on the upper and lower reaches of the Rhine, where Ludwigshafen, Hoechst and Leverkusen are the principal centres of chemical production. The centre of gravity, however, had gradually moved eastwards. It has been calculated that the investment value, less depreciation of I.G. Farben works in the Soviet zone, amounts to Rm. 2,700,000,000, whereas the assets of the combine in the three western zones did not exceed Rm. 2,100,000,000. From these sums, war damage must be deducted to the amount of Rm. 254,000,000 and Rm. 340,000,000 respectively.

The clarification of the position brought about by the decentralisation of the combine and transfer of responsibility to regional and local staffs is expected to help in stimulating production. Coal production in the Ruhr has recently shown a slight increase, with the result that more fuel can be made available for chemical works. These are to make an important contribution to the home and export trade, fertilisers and industrial fats receiving special attention.

RADIO-ACTIVE ISOTOPES

Export of Twenty Groups from U.S.

FOLLOWING the lifting of the U.S. ban on exports of radio-active isotopes, announced this week by President Truman, Australia became the first purchaser of isotopes under the new programme. The first shipment abroad, consisting of 20 millicuries of phosphorous 32 for treatment of an urgent case of polycythemia vera, a blood disorder, left the Clinton Laboratories at Oak Ridge, Tennessee, consigned to the Commonwealth X-Ray and Radium Laboratory, Melbourne.

Arrangements for the shipment, which was made by air, were made by the Australian Embassy's scientific liaison office. Air shipment of phosphorous 32 is necessary because that radio isotope has a half-life of only 14.3 days.

Types Available

The following are the radio isotopes to be made available to foreign countries and their principal fields of use:—

Antimony 122, 124, 125 for the study of venereal and general parasitical diseases; arcon 37 for study of respiratory functions; arsenic 76, 77 for the study of action of insecticides, arsenic, drugs and fumes; bromine 82 for studies of action of bromine drugs, including sedatives; calcium 45 for the study of bone and teeth formation, rickets and bone diseases; carbon 14 for studies of cancer, photosynthesis, biological processes; chlorine 36 for the study of chlorine utilisation by the human body; cobalt 60 for studies of cobalt utilisation by animals and for therapy requiring gamma radiation; copper 64 for botanical studies; gold 198, 199 for studies of blood diseases, especially leukemia; iodine 131 for therapy in thyroid disorders, including certain types of thyroid cancer; iron 55, 59 for studies of the blood; mercury 197, 203, 205 for studies of the action of mercuric drugs; phosphorous 32 for study of polycythemia vera, chronic leukemia, bone and teeth formation, fat and protein metabolism; potassium 42 for the study of diseases of the nervous system; Silver 108, 110, 111 for the study of drugs containing silver and for radiation therapy; strontium 89 for the study of bone metabolism; sulphur 35 for studies of amino acids and proteins, studies of the action of penicillin and sulphur-containing drugs; sodium 24 for studies of exchange of body fluids and blood flow, principally in connection with heart disorders; zinc 65, 69 for studies of the action of insulin.

Requests from foreign countries for shipments of isotopes will be handled by the Isotopes Branch, United States Atomic Energy Commission, Oak Ridge, Tennessee.

The commission will shortly publish a catalogue for foreign purchasers which will include detailed instructions for ordering isotopes, price lists, and precautions to ensure safe handling of the materials. Prices to foreign buyers will be about the same as those for U.S. purchasers.

CLAY CONVENTION

Papers on Ceramics

THE British Ceramic Society has co-operated with the National Federation of Clay Industries in arranging the following programme of technical papers for the mornings of Thursday and Friday, September 25 and 26, during the Clay Convention at Scarborough.

The programme is as follows:—

Thursday, 10 a.m. to 12.30 p.m. The following short papers, all relating to the mechanical firing of brick kilns, will be read and discussed:—

- "Review of the Use of Mechanical Stokers in the Heavy Clay and Refractories Industries," by E. Rowden.
- "An Experiment with Automatic Stokers on a Salt-Glazed Rectangular Kiln," by R. G. Parker.
- "Some Experiences with the Application of Automatic Underfeed Stokers to Existing Down Draught Kilns Burning Salt-Glazed Sanitary Pipes," by J. Smith.
- "Mechanical Stokers for Continuous Kilns," by S. B. Stedham.
- "Data and Fuel Saving by the Patented Application of the Underfed Stoker to Kilns," by H. Torkington.
- "The Application of Underfeed Stoker Firing to a Silica Brick Kiln," by T. R. Lynam.

Friday, 10 a.m. to 12.30 p.m. The following papers will be read and discussed:—

- "Power in Relation to Process Requirements in the Heavy Clay and Refractories Industries," by D. L. Wilson and E. Rowden.
- "The Mechanical Digging of Clay with Single Bucket Excavators," by S. H. Hollowday.

A general meeting of the Building Materials Section of the British Ceramic Society will be held at 9.30 a.m. on Friday, September 25, at the Royal Hotel, Scarborough, when the question of the general secretaryship of the whole Society will be considered.

A British Ceramic Society luncheon will be held on Thursday, September 25. Applications for tickets should be made to Mr. H. Halliday, convention secretary, Drayton House, 30 Gordon Street, London, W.C.1.

Superheating by Electricity

AN INTERESTING DEVELOPMENT

CONSIDERABLE advances are being made in various countries with the small electric steam and hot-water boilers for many small industrial establishments with installations using up to, say, 1000-1200 kW. These appliances have a wide field of application, and are no more costly to operate than coal- or oil-fired heaters when electricity is reasonably priced, *i.e.*, from ½d. to 1d. per unit.

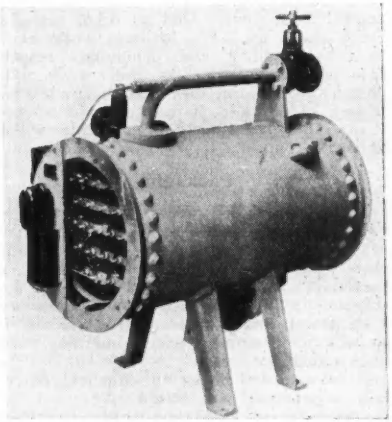
Under certain given conditions, the use of electricity for steam superheating and other applications may prove of interest. A typical installation recently supplied to a large research laboratory by a London firm has an electric superheater rated at 16 kW for 346 volt, 3 phase, 60 cycles, which supplies superheated steam at a pressure of 200 lb. per sq. in. at a temperature of 500° F., the maximum capacity being 450 lb. of steam per hour.

The general principle consists of a horizontal steel cylinder containing a series of 18 horizontal electric resistance heating coils, each of which is contained in a small-diameter steel tube fixed horizontally throughout the length of the casing in five rows, one above the other, connected to a terminal cover at one end of the casing. The steam enters the latter and is superheated by contact with highly heated steel tubes which contain resistance coils sealed off from the steam, the whole being equipped with thermostatic control gear to maintain the steam at any desired temperature.

Ease of Regulation

Superheating in this way for smaller installations carries all the advantages of electric heating in that no operators and very little maintenance are required. The apparatus has a very high thermal efficiency, occupies relatively little space per unit output. Starting up or shutting down is easily and quickly accomplished. Safety of operation and easy and accurate automatic regulation of the temperature of superheat are other attractive features. Operating costs are easily assessed—taking the thermal efficiency as 95 per cent—while all the inherent troubles associated with the use of gaseous, liquid, or solid fuels, that is, dust, grit, and poisonous smoke and fumes, and the need for tall chimneys, together with a large amount of storage space for the fuel, and complications as regards disposal of dust, ash and clinker are completely eliminated.

In connection with electric heating, there is a standard range of electrode steam boilers available in sizes of from 25-1000 kW, taking A.C. at 346-440 volts, 3 phase, 50 cycles, evaporating 75-3000 lb. of water per hour for any desired steam pressure. Boilers are in the shape of vertical cylinders made from solid drawn steel. Electrode hot-water boilers are supplied within the range of 30-1200 kW giving 102,000-4,080,000 B.Th.U. per hour, and have either manual or automatic control. In both cases, operation is at 98 per cent continuous thermal efficiency since all the heat is released into the water itself, the boiler being merely a steel shell heavily lagged with 2-in. magnesia-asbestos blocks.



Electric thermostatically controlled superheater rated at 16 kW., for A.C. 346-volt 3-phase 50-cycle supply, superheating steam at 200 lb. per sq. in. to a temperature of 500° F., showing the terminal cover partially removed.
(BASTIAN & ALLEN, LTD.)

Society of Chemical Industry

Agricultural Group Meetings

On the undermentioned dates the following papers will be read at meetings of the Agriculture Group of the Society of Chemical Industry in the chemistry department of the Royal College of Science, Imperial Institute Road, S.W.7: "Fertiliser requirements of wheat as determined by field trials"—Dr. G. A. Cowie, Potash Limited (October 21); "The rôle of chemistry in recent developments of animal insecticides"—Dr. R. S. Cahn, the Cooper Technical Bureau (November 18).

CHEMICAL PORCELAIN (*Contd. from p. 356*)

which have been economically produced of chemical porcelain for specific problems are: blow pipes and ejector tubes for process vessels; nozzles and tubes for brick-lined tanks; brick and tile shapes; orifice plates and venturi tubes; pots, jars and dishes; pump and valve sleeves and rings; nozzles, jets and diffusers; and laboratory porcelain sinks.

In developing the ceramic body used in chemical porcelain a balance has been maintained between chemical stability, mechanical ruggedness and practical manufacture.

To sum up, chemical porcelain is a dependable construction material; given reasonable handling and care it will work almost indefinitely. It has been used for some seven years, often under operating conditions so severe that no other material could stand up. The brilliant white glaze suggests fragility and commands respect from operators; but as they work with chemical porcelain, they find that, although it may look fragile, it is often more rugged than other construction materials which appear strong.

Packaging

Most porcelain pieces, pipe fittings, valves, nozzles and miscellaneous shapes are packed in wooden boxes or wire-bound crates while some valves are shipped in cardboard cartons. Large vessels are shipped in wooden boxes and positioned with clamps and braces. If porcelain is to be kept in storage, excess handling must be avoided.

Ground gasket faces on chemical porcelain equipment are often protected by gummed tape: this tape, which protects the relatively fragile edge on these ground surfaces, should not be removed. On the valve ends, there is, sometimes in addition to the tape, a paper disc, which seals the valve seat against dust, etc., which should not be removed until the valve is being installed. When discs are removed valves have to be inspected carefully to make sure the insides of them are clean and free from packing or other foreign particles.

When ready to install porcelain piping, the tape has to be removed from the ends and the gasket faces cleaned of tape, gum, or any foreign matter. This is important in keeping joints tight. Porcelain gasket faces are precision ground smooth, flat and square with the axis which permits the use of a thin, relatively hard gasket material. Thick, compressible gaskets (such as $\frac{1}{8}$ in. soft rubber, cork, etc.) have two disadvantages; a greater surface is exposed to acid attack; and gradual compression of the material may loosen the joint, causing leakage. Experience in the field indicates that blue asbestos with a rubber binder is usually equal to or better than other materials. Some plastic sheets such as Vinylite, available in 1/64 in. thickness, may be satisfactory. Operators have found a heavy waxed paper entirely suitable for certain work.

Installation of gaskets is simplified if asphalt or similar gasket paste is used on the pipe end so that the gasket may be centred and attached on one face before the adjoining pipe is brought into position. Whether gaskets are installed dry or with paste, they should be carefully checked. Gaskets with defects such as folds, hard spots, etc., should not be used.

Nuts should be pulled up uniformily to the recommended tension. Standard ring and bolt hangers may be used on porcelain pipe lines. It is important to protect the porcelain from impingement of the metal straps by placing a thin (1/16-1/8 in.) strip of red fibre or similar stock between the porcelain and metal. Hangers should be spaced from 5 to 10 ft. apart depending on pipe size and other factors. Not more than one hanger per length is usually required. Mechanics are more prone to hang porcelain pipe too rigidly on too close centres than vice versa. Do not clamp porcelain too rigidly. Give it a margin of freedom to accommodate mechanical and thermal strains and adjustments.

Unlike metals, there is no fatigue loss of strength in porcelain. Vibration is to be avoided, however, to protect joints, gaskets and bolts from loosening. Vibration movements may be prevented from reaching the porcelain by placing a rubber snubber between the hanger straps and porcelain, and by allowing the porcelain to ride free in the hanger.

Although porcelain is physically tough, it is still a ceramic and its yield point is its breaking point. The porcelain may crack if abused or hit accidently. For this reason it is good practice to protect the porcelain at points vulnerable to mechanical shock. Under stairs, or overhead walks, low running lines in alleys are all danger points. Housing porcelain within a simple wooden frame or gable affords ample protection. Porcelain lines that are to run hot must be protected against sudden cold shock. Such shock might be a sprinkler head blowing, or a summer shower. Simple pipe insulation is adequate.

The Small Factory

The future of the small factory in British industry, a subject which contemporary political and economic trends has rendered rather problematical, is studied at length in an article by Mr. J. A. Aplin in the year book just issued by the Institution of Factory Managers.

SHIPMENT, STORAGE AND HANDLING OF SODA ASH

by H. SEYMOUR

SODA ash is usually shipped in barrels, burlap and paper bags, as well as in bulk cars and barges. Owing to the obvious saving in package cost, bulk shipments have increased materially during the last decade. Notwithstanding the cost advantage of receiving shipments of soda ash in bulk, bulk storage space may not be readily available, and provision must be made to lessen the annoyance from dust incidental to its handling; this is especially noticeable in the handling of light soda ash, but may also be evident to some extent in the handling of the heavier and larger grained dense soda ash. The saving in package cost is also partially offset by the cost of weighing the product in bulk and by the salvage value of the containers—if these are barrels or burlap bags.

The inconvenience to workmen from the dust may be alleviated by the use of a respirator, and by careful selection of machinery and equipment. There is generally no justification for special fans and dust collectors in the buyer's handling arrangements. The most effective types of collectors consist of cotton dust partitions or stocking which must be vibrated and periodically renewed, though the first cost and operating costs are so large as to make this sort of equipment economically undesirable and unnecessary in an isolated neighbourhood where dust is of minor consequence.

Soda Ash Dust

If soda ash in solution can be used in the plant process, dust can be collected by means of a cyclone separator with water sprays introduced around the point of entrance of the dust-laden air. The exit air can be still further cleaned by a commercial type of eliminator or wet baffle box. Exposure to soda ash dust is not as a rule dangerous to health as such dust is soluble and does not accumulate in the pulmonary tract. Certain individuals become accustomed to working in the dust in a short time and experience relatively little discomfort. To lessen the risk of dermatitis, to which some workmen may be subject, there are a number of ointments on the market for pre-application, and these should be made readily available to all workmen. An approved safety belt with attached rope should always be worn when entering bulk storage bins.

Bulk soda ash is generally transported in ordinary box cars or more conveniently in self-discharging cars. One of the latter types is loaded through hatches in the top and discharged through an opening in the bottom to which the soda ash is moved by built-in motor-driven drag-chain conveyors. More common is the covered hopper car specially designed to handle finely-divided granular substances. These are self-clearing, permanently enclosed cars provided with eight to ten weather-tight roof hatches for loading and four (two pairs) of bottom openings for unloading, having tight-fitting weatherproof gate closures. Rail clearances and outlet dimensions vary, but suitable unloading adaptors provide closed conveying systems which minimise dust conditions.

Under Cover Discharge

Where a clean, dry floor is available between the rails, as in a warehouse, a simple and practicable plan is to place the suction head of a pneumatic system on the floor under the car, open the hopper outlet gate over it and let the soda ash bank around the head. If the pile is protected from winds there will be little or no dust. When it becomes necessary to transfer soda ash beyond the economical range of a belt conveyor, it has been proved practicable to employ a motor truck. For this purpose a dump truck is satisfactory when fitted with a wooden or sheet metal box or container which, for intermittent service, can be made detachable so that the truck may be used for other purposes. The container must have a weather-tight roof in which are located hatches for filling and one or two outlets at the rear (near the bottom) for discharging the contents. These discharge openings may be fitted with 12-in. diameter nipples to which canvas sleeves are attached to serve as chutes for discharging the soda ash into the boot of an elevator or storage. The sleeves, when folded back and secured to the top of the truck, will serve to close the outlets during loading and transit.

The truck arrangement is especially adapted for handling bulk soda ash from barges to plant storage. The soda ash in this case, if in an isolated neighbourhood, may be unloaded from the barge by a crane using a clam-shell bucket into an elevated hopper discharging into the truck. Where bulk shipments of soda ash are made in cars or barges, it is necessary to provide a storage which has a minimum capacity of something more than a car- or a barge-load. In some circumstances, in order to reduce the size of storage, the capacity is supplemented with material in bags or barrels.

Storage of soda ash in loose piles on the floor, even in rooms that separate the piles from the other parts of a building, should be considered only as an emergency measure. Draughts produce dust conditions, as well as increased moisture and carbon dioxide absorption due to the hygroscopic nature of the ash. Moreover, the handling to and from the pile by wheelbarrows is costly. Bins, bunkers or silos are recommended.

Cylindrical or approximately square cross-section bins or storages have been found by experience to present considerable difficulty in reclaiming light soda ash, which clings to the sides of the bins and tends to arch, making removal difficult and necessitating hammering the bin to loosen it. A practical form of storage for light soda ash, bearing in mind the ease of reclaiming, is a rectangular bin having a long V-shaped (trough-like) bottom with numerous lengthwise outlets fitted with gates in ducts leading to a conveyor, and short removable canvas sleeves connecting the gate nipples at the bottom of the bin to the conveyor. These canvas sleeves are a desirable feature since they enable the operator to determine whether or not the soda ash is flowing from any particular spout. They also adjust for any misalignment of the outlet nipples.

Size of Bins

The bottom of the bins should be inclined at an angle of at least 45° from the horizontal, and it is advantageous to have a few feet of the sides at the bottom of the trough made of steel plate so that the surfaces can be vibrated or hammered to start the flow of soda ash, in the event of a "hang-up." In relation to its width, the bin should not only afford space for the numerous draw-off points, but should also lessen the effect of the ends in holding up the soda ash. It will be found that the cost of the structure, per ton of storage capacity, will tend to decrease within limits as the bin is made longer. Wood construction is the best proposition, though steel or concrete may be employed throughout for purposes of fire-prevention. The storage can be readily roofed over when placed outdoors, and should be large enough to afford a considerable dust-settling volume when handling light ash; vents may be covered with burlap to suppress escape of dust.

For dense soda ash, which is more free-flowing than the lighter varieties, almost like dry sand, the long trough-shaped bin design becomes unnecessary, if the sole consideration is to obtain a free flow of soda ash. Moreover, in such industries as glass manufacture, where it becomes important to preserve the grain size of the dense soda ash and likewise important to prevent segregation, the long trough-shaped bin may be conveniently subdivided into several sections to lessen segregation. It is advisable not to vibrate such dense soda ash bins, since vibration tends to promote segregation.

There are, among other types, soda ash hoppers of the V-shaped form of bottom which have screw conveyors placed within the hoppers, all arranged to draw soda ash to a central point. In this design, in order to obviate excessive use of power, it is necessary to take the weight off the screw by a grid system. In spite of this provision, however, the power requirement is variable and uncertain, depending upon the manner in which soda ash packs around the screw. This design, therefore, cannot always be recommended except in special cases where it is desired to save head-room. The screw conveyor or other form of extractor mechanism should be of heavy design to cope with large overloads.

Barrel Storage

Where shipments of soda ash are made in barrels or bags, it is obviously not necessary to provide large bins for bulk storage. Suitable space must, however, be reserved to accommodate incoming shipments in such containers, and facilities should be provided for the prompt unloading of railway cars or trucks. Barrels or bags of soda ash should not be stored in basements unless these are absolutely dry. Damp floors, damp air or leaking roofs will in time bring about absorption of moisture, as well as carbon dioxide, and result in caking and reduced alkalinity. Floors should be capable of supporting concentrated loads, and permit hand-trucking in and out of storage. Large tonnages are best handled on belt conveyors. There is usually some spillage caused by slight amounts of material clinging to the return belt. This can be minimised by brushes, and if the conveyor is in a weather-tight housing the spillage can be recovered.

Dust conditions, formerly the chief objection to conveying soda ash and other dusty material by means of belts, are usually confined to the loading and discharging points. Special dust housings at these points have therefore made the use of belt conveyors fairly successful. If it is necessary to discharge a belt conveyor at more than one point, a tripper—which is ordinarily used—will usually cause sufficient dust to warrant the installation of a screw conveyor or similar system. All bearings and idlers on a soda ash belt conveyor should be of the anti-friction dust-proof type.

Screw conveyors are commonly found in alkali plants where conditions are frequently hot enough to ruin fabric belts. The commercial screw conveyor, as generally constructed, is not well suited to handling the ash in continuous service, as it is quite impossible to lubricate the hanger bearings

since the lubricant is decomposed by the soda ash and may form an objectionable constituent. It is therefore necessary to provide bearings that will run without lubrication.

Where continuous service is demanded, the parts of the conveyor should be of especially robust design and be amenable to quick repair and replacement. Special cast-steel hangers and couplings are used, and invariably an unusually heavy pipe is employed in the construction of the flights. The coupling should be so designed that the flights can be lifted vertically without disturbing adjacent flights, and as the capacity of a screw conveyor is limited by the capacity at the hangers, special attention should be given to the design at these points. Cast-steel hangers may be of smaller section and thus serve to decrease the constriction at the hanger points.

The trough of the conveyor, which is equipped with covers that form dust seals, is commonly made of a rectangular section, since the square corners serve to catch tramp iron. It should not be anchored rigidly to its supports, since there may be a temperature difference between the screw and the trough. If the trough *is* firmly fixed, the bearings tend to crowd out of line and an excessive amount of power is required. Screw conveyors are frequently made with bottomless troughs for trimming storages.

Conveyors

The internal ribbon type of conveyor is a form of screw conveyor consisting of a helical ribbon on the inside of a rotating cylinder, and is dustless in operation. Considered simply as a conveyance, not only is it far from superior to other conveyors generally, but it has the disadvantage that it is difficult to free an internal ribbon conveyor of soda ash once it becomes plugged. It is also not an easy matter to keep the conveyor in line if more than two points of support are needed. This is due to the fact that the shell is frequently stiffer than the supports upon which it rests. Welded girth seams in the shells of long conveyors of this type are not recommended on account of their great rigidity, and because they run very badly on their bearings. Riveted girth seams are regarded as being far more satisfactory. These objections apart, the internal ribbon conveyor is sometimes satisfactory where it is desired to cool or heat as well as convey dusty materials all in one operation.

Pneumatic conveyors are often used extensively for handling soda ash, by transporting it in a current of rapidly moving air. There are two types of such conveyors—the exhaust or suction type and the blower or pressure type; or both types may be combined. Each has its use, and both involve a pump, blower or fan for producing the movement of air, a receiver for collecting the bulk of the transported material, and a dust separator. The capacity of a suction system is limited largely by the size of the hose that can be handled in a car. The largest in ordinary use is 4 in., though a 3-in. hose is more common. The usual capacities are from four to eight tons per hour per nozzle, depending upon the uniformity and constancy of feed to the nozzle in the car. Although a suction system has the advantage that dust can be more nearly suppressed than in any purely mechanical car-unloading scheme, the car's operator will still be exposed to some dust. Nevertheless, such a system more than justifies itself in many cases where it is permitted by the higher costs of installation, operation and maintenance as, provided the larger space is available, it frequently offers the only solution.

Pressure Conveying

Soda ash can be conveyed by an air current in a pipe operating under pressure. The compressed air is usually generated by a blower or a pump and is introduced into the pipe through an ejector nozzle. This scheme may be employed in conjunction with a suction system where it is required to transport the ash more than 500 ft.—the usual economical limit of the suction system. The limit of the air pressure scheme is said to be about 2000 ft.

As distinguished from the unloading and transport schemes described above, there are in use systems which force the ash, by means of a variable-pitch screw, into a relatively slow moving current of high-pressure air which fluffs up the material and causes it to float along the pipe in a dense mixture of air and material which simulates a fluid. Owing to the irregular flowing tendency of soda ash, its lightness and other properties, such systems have not always been entirely satisfactory. Power consumption is large and interruptions frequent enough to question the practicability of the scheme in some cases. Blow-backs and line plug-ups are among the most frequent difficulties encountered. Smaller installations of this type of conveying system appear to handle soda ash more satisfactorily than larger ones.

The system can be recommended where the ash has to be conveyed along circuitous tracks, around corners and obstructions, and it seems to work best when the soda ash is fed at a constant rate. The system is not suited for dense soda ash because it breaks the particles. Soda ash has been transported about 2000 ft. in a combination vacuum and blower pressure system, at a rate said to be about 20 tons per hour. Only in cases where it is necessary to suppress

dust can the first cost and operating cost of such equipment be justified in comparison with other types of conveyors and transportation schemes.

The drag flight chain conveyor, which is a comparatively new device suitable for both horizontal and vertical transportation, has many of the advantages of the screw conveyor. It will convey hot materials and is practically free from dust-raising. Although it can be used for light as well as dense soda ash, when employed as a tall elevator, cases of soda ash becoming packed in the legs and loops and between the flights have been reported. This type of conveyor consists of a chain passing through a trough or set of guides, the links of which have been shaped to form flights of skeleton design or have flights attached to them.

Elevators

Bucket drag scrapers are in use in large flat-bottom storages for reclaiming light soda ash. However, such storages are regarded as somewhat dangerous to operate if the stock piles are high, as soda ash tends to slide suddenly. Drag scrapers are generally uneconomical from the standpoint of operation.

In the alkali industry, elevators for soda ash are of two principal types: the vertical continuous bucket, and the vertical spaced bucket with centrifugal discharge. A bucket elevator has a sharply limited capacity. Overloading may cause a plugged chute, may burn off the belt (if it is of fabric construction) and may cause an excessive amount of trouble in various other ways. Where the material is conveyed by belt, if room permits, it is usually better to employ an inclined belt. However, this is seldom the case within existing buildings as the maximum angle of inclination for soda ash is about 22°, modified somewhat by the method of feeding the belt and its speed. Elevating by belt in the case of dense soda ash tends to prevent the breakage of particles.

The continuous bucket steel chain elevator is a usual design for alkali plants. A single chain is preferred to the double chain type, as the latter has been found to wear unevenly and eventually to cause operating trouble. In handling soda ash or other fine granular materials, the belt bucket type of elevator is a good design from an investment and operating point of view. There are fewer metal parts to wear off or fall off into the product than there are with steel bucket elevators. The life of an elevator belt handling cold soda is long; in some cases belts have lasted more than 30 years in steady service. As compared with chain elevators, the belt elevator can be watched for weakness, and belt renewals made at convenient times; a chain breakage is more apt to occur without warning; a casing full of buckets, chain or belt produces an emergency difficult to overcome. Soda ash is to some degree abrasive, and chain elevators especially need routine inspection and maintenance.

It is generally desirable to install rubber washers between a fabric elevator belt and the buckets. These help to keep the elevator clean by keeping the soda ash from building up between the bucket and the belt. Such building-up strains the bucket bolts excessively and destroys the fabric around them. Special elevator bolts are used to fasten the buckets to the belts and to splice the belts.

Experience shows that soda ash elevators of the centrifugal discharge, spaced-bucket type can be overspeeded as much as 35 per cent or more over the catalogue speeds, with corresponding increases in capacity if:—

(1) The buckets are loaded on the vertical leg and not forced to dig out of the boot. This calls for a deep elevator pit.

(2) A curved plate is installed at the head end on the ascending leg in order to prevent the soda ash being discharged before it has passed the head pulley. This tends to prevent so-called "back-legging."

(3) The elevator is supplied with a uniform feed.

The first condition ensures the buckets being filled and not cuffed out by the centrifugal force at the bucket. The second requirement keeps the soda ash from falling down the ascending leg. Such soda ash as is discharged at the head end is carried over the head pulley by the dragging action of the buckets, the loose soda ash playing between the curved plate and the buckets on the head pulley. If it is impracticable to supply the elevator with a uniform feed, it is best to use a standard boot as supplied by conveyor manufacturers. These are not so liable to plug as a result of surges and variations in the rate of feed. However, the buckets tend to cuff the soda ash up the boot entrance chute with the result that they are filled from only 50 to 75 per cent of their struck volume.

Screw Elevators

A type of elevator which has been recently developed elevates material vertically by means of a screw conveyor. It is said to be capable of handling many products (such as soda ash) that can be conveyed by a horizontal conveyor. These elevators are compact, dust-tight and weatherproof. The installation cost is small, operation is simple, and the power requirement is said to be only slightly more than for bucket elevators of equivalent capacity. They are made in sizes from 6 to 12 in. in diameter, have capacities

(*Continued on page 370*)

NEW CHEMICAL EQUIPMENT

U.S. Displays Post-War Progress

POST-WAR progress in the chemical industries and war-time innovations lately revealed will be reflected by exhibits at the 21st Exposition of Chemical Industries at Grand Central Palace, New York, on December 1-6. News from exhibitors indicates a marked trend in the development of materials and units of all types designed to meet extremely difficult operating conditions, notably very high pressures and temperatures, and powerful corrosive effects. The exposition will be one of the largest of its kind ever held in America, with an unusual variety of displays including industrial chemicals, chemical products, industrial materials and supplies of many kinds, in addition to the wide range of equipment specifically designed for the process industries.

More Stainless Steel

Stainless steel is coming into still wider use in the chemical industries, and one exhibit will be exclusively devoted to this material and another will feature the precision casting of stainless steel alloys, pure nickel and monel metal, as well as valves and fittings of the stainless steel alloys.

Other exhibits will show portable and stationary horizontal plate filters of stainless steel; a display of lead-lined products including poured homogeneous lead linings on steel, lead-covered copper tubing, lead prefabricated fittings and flanges, lead equipment for the confinement of nuclear energy and also a new leaded grease for open gears and bearings.

High temperature sintered refractories of fused alumina, zirconia and other oxides, for temperatures of 1700-1800° C., catalytic carriers and supports, as well as pebbles and spheres for heat transfers, are being provided for another display.

Jet Development

A new development in the jet field which will be shown at the exposition is an eductor in which granular solids are " entrained " and conveyed by a pressure liquid, doing the work traditionally performed by the mechanical conveyor and eliminating dust.

In the laboratory field, the exposition also promises to be highly productive of new things. The infra-red gas analyser, initially developed in connection with the atom bomb project, is now finding extensive applications in petroleum, steel, chemical and allied industries which require continuously recorded analysis of components in a process stream. The apparatus to be exhibited will give a continuous record of CO_2 concentration in the atmosphere of the Grand Central Palace.

NITRATE BAN ATTACKED

Committee's Recommendations

IF proper precautions and supervision are provided, ammonium nitrate fertiliser—which has caused at least two major disasters in the last six months and was recently banned from New York port—may be transported with " reasonable safety " aboard marine vessels. This is the decision of a special committee of Federal officials.

To prohibit the handling or transportation of ammonium nitrate, the committee found, would not be a practicable solution to the problem, since many other substances necessary to the national welfare and economy and possessing minor or major hazards are now being shipped commercially. The banning of nitrate shipments, the committee added, would also adversely affect the economy of the American farmer and the programme of relief to war-devastated countries.

Not an Explosive

The committee, composed of eighteen representatives of government agencies interested in the transportation of the fertiliser, also recommended a series of safety measures for handling the substance. It ruled that chemical should properly be classified in Coastguard regulations as a dangerous oxidising material, rather than as an explosive, since it would not heat spontaneously and was not affected by friction or impact normally encountered in transportation.

Fire, the Chief Hazard

" The committee feels," the report stated, " that, with proper precautions and adequate supervision of all phases of loading, stowage and transportation on board vessels, ammonium nitrate can be transported with reasonable safety. The principal hazard to guard against is fire." The explosive hazard of ammonium nitrate fertiliser in normal land transportation was negligible.

The committee accepted the findings of a Coastguard board investigating the Texas City disaster, which devastated the city and killed 500 and injured thousands, that the explosion aboard the *Grandcamp* was caused by the " careless disposal of cigarette butts " and that the subsequent explosion aboard the *Highflier* was the result of the " and possible contamination of ammonium nitrate with sulphur."

The chemical stability of the substance, unaffected below temperatures of 200°F., must be altered by " fire under confinement in a compartment which lends itself to retention of heat and the building up of pressure and contamination with sulphur or other substances and subsequent ignition by fire," the committee reported.

RIVER POLLUTION (*Contd. from page 354*)

inshore pollution from chemical effluents of from the dumping of surplus wartime ammunition into the sea, but it is a well-known fact that a large area of the Cumberland in-shore fishery was destroyed by the dumping of surplus ammunition into the sea after the first world war. Sufficient example I think has already been given to prove the case that chemical pollution is seriously reducing an essential source of national food supplies. It remains to suggest some remedies.

It is a very interesting fact that no serious effluent problem has been experienced by the Dee Fishery Board from the Sandycroft Chemical Works whose effluent is comparatively small and disappears into a deep sub-stream soak-away, with no apparent connection with the river bed. The problems of river pollution depend also upon the amount of water flow in the river to cope with the pollution and dilute it. Serious pollution may, therefore, arise without any increase of effluents, but owing to hydro-electric stations and industrial plants taking water out of river estuaries and courses, or water-cooling and electric power plants discharging millions of gallons of hot water, 85° F., which has not the same oxygen ratio to cope with sewage, etc.

Canning and Silage Wastes

Suspended solids in the wastes from tomato, corn and pea canning factories, should be screened or filtered on to the land for much-needed manure. On no account should untreated silage waste from farms be deposited into sewers. The use of lime, or in some cases lime and ferric chloride, will encourage settling and sludge formation in the screened wastes from tomato, red beet and other canneries, and the dried sludge cakes can be sold for manure. Tomato waste is so acid that it requires 1 lb. of lime per 500 gallons before filtering through a filter bed.

Effluent from dye works can be treated in bacterial filters in the same way and same time as domestic sewage. The problem of many towns is the limited capacity and out-of-date methods of their sewage plant although Alternating Double Filtration would cope with many problems. Estuary towns and industrial plants on Tyneside could construct main sewer trunks to carry the sewage and the industrial wastes to purification works lower down the river, and from thence out to sea. Liverpool, like Gibraltar, has some sewage barges engaged in dumping at sea, but this is only an infinitesimal proportion. Spent sulphuuric acid effluents should be treated with lime and caustic soda and allowed to settle before passing into the sewers. Caustic wastes need a soda recovery plant. Mechanical screens will take out cotton wastes from artificial silk works and some heavy coagulated tar products from industrial effluents.

The Monsanto Chemicals, of Cefn Mawr, have spent £80,000 on pollution prevention measures, including dilution lagoons with a capacity of 5,000,000 gallons, and an American Dow process of bacteriological effluent treatment costing £75,000.

SODA ASH (*Continued from page 368*)

up to 50 tons per hour, and are capable of elevating up to 50 ft. These rotary elevators may be especially suited to intermittent service as in elevating fine materials from a track hopper to a storage bin, rather than for continuous day-in and day-out heavy-duty work.

The power requirements for elevating and conveying soda ash vary widely with different methods, equipment and rates of handling. Power estimates useful for preliminary and approximate plans, but not sufficiently accurate for designing purposes, expressed in terms of horse power to elevate or convey 10 tons of soda ash per hour to a height or distance of 100 ft., are:—

To elevate by bucket elevator, 10 tons per hour through 100 ft. height—2 h.p.

To convey by level belt, 10 tons per hour through 100 ft. distance—.2 to .5 h.p.

To convey by screw conveyor, 10 tons per hour through 100 ft. distance—5 to 7.5 h.p.

To convey by air suction system, 10 tons per hour through 100 ft. distance—30 to 60 h.p.

Revalidation of Indian Licences

Indian import licences for commodities listed below, instead of expiring on June 30 last have been automatically revalidated by a recent Public Notice issued by the Chief Controller of Imports, New Delhi. The licences, will now remain valid until December 31, 1947 (Appendix I) or September 30, 1947 (Appendix II).

Appendix I:—Mineral oils (flash point not less than 150°F.); pine oil; synthetic essential oils; greases, petroleum jelly and paraffin wax; metallic ores (except ochres and other pigment ores); and asphalt.

Appendix II:—Sodium acetate; sulphate of alumina (iron free); chromium acetate, hydrosulphite of soda; Rangolite C or Formosul L; sodium nitrite; Shirlan paste; desizing agents; levelling agents; penetrating agents; scouring agents; wetting out agents; emulsifying agents; mordanting agents; turkey red oil; oil and grease removers; textile oiling agents; solvents for printing discharging agents; anti-reduction kier boiling; and softening agents; zinc chloride; dyes derived from coal tar, and coal-tar derivates, used in any dyeing process. Various chemicals, drugs and medicines and chemicals in bulk packing *excluding* potassium bichromate, sodium bichromate, sodium sulphite, sodium bisulphite, sodium hyposulphite, chromic acid, and chromic sulphate.

Scientific and surgical instruments.

A CHEMIST'S BOOKSHELF

The Mechanism of Contact Catalysis. By R. H. Griffith. 2nd. Edition. pp. 273. Oxford University Press. 1946. Price 21s.

It is no exaggeration to say that chemical reactions on the scale required by the present chemical industry would have been impossible without the discovery of catalysts. The immediate and successful technical application of catalysts has made research into the conditions which govern their operation a profitable venture. Because of the inevitable development, however, the original research, which was concerned chiefly with improving the efficiency of industrial reactions, has been found to be inadequate and study of the catalyst itself has proved a more fundamental and sounder line of approach.

That the subject has been a favourite one for research is evidenced by the great number of papers published from year to year. The author of this book, realising that few had access to all the literature on the subject, published the first edition in 1936, thereby helping to co-ordinate the findings of various workers and amplify the knowledge of the subject which had been compiled earlier by Rideal and Taylor. The present edition is similar to the first in that the author reviews the more important papers published in the last twenty years. Several additions have been made in view of the fact that interest in catalysis as a subject for research seems not to have diminished since the publication of the first edition. The increasing knowledge of processes such as diffusion and adsorption and especially of the nature of surfaces and the unbalanced atomic forces which exist there has, in fact, given a certain impetus to further research in the mechanism of contact catalysis.

Such discoveries have necessitated rewriting some sections, but where further information has confirmed past findings the treatment is unaltered, although additional references are given. On the other hand, some controversial items have been omitted. The preparation and activation of catalysts have received more comprehensive treatment than in the first edition in view of the increased interest in their structure. There is an expanded section on crystals and lattice defects, and more attention has been devoted to the disposition of organic reactants on the catalyst surface since this seems to be one of the more promising methods of elucidating the action of catalysts. Gas-solid systems are treated at greater length.

Although the book covers a wider field than might be imagined from the title, it remains essentially a critical review of the subject. Because of this the author has evidently found it difficult to arrange his material in the systematic manner characteristic of a good text-book. The provision of cross-references, which are generally undesirable, has not solved this problem. Beyond pointing out—and rightly so—that experimental results should be interpreted with caution in view of the many difficulties encountered in work of this type, the author does not indicate which papers are worthy of further study and is content to mention very briefly the findings of the investigators. While appreciating the difficulty of summarising the results of many workers, the reviewer feels that some chapters of the book tend to be collections of facts which must be appraised by the reader.

As a review, however, the book is excellent and may be recommended to all who wish to keep abreast of latest developments in this important branch of chemical research.

T. B. KING

SCOTTISH QUICK-FREEZING INDUSTRY

The development of the quick-freezing industry in Central Scotland is being pressed forward with the maximum speed and energy by fruit growers, potato growers, farmers, meat producers, for whom this new method of processing promises to be attractive. Dundee has been selected as an obvious central point for this work and considerable expansion has already taken place there.

Quick-frozen tomatoes, rhubarb, potatoes, asparagus, cauliflower, cherries, loganberries, and red currants attracted tremendous attention at the Dundee Made Exhibition, and demonstrated the current trend of activity in this area where one large firm (Smedley's Ltd.) has now taken over a former flax mill for an extension of its activities.

This development of quick freezing is being limited at present only by the lack of adequate machinery and facilities to handle the bulk of produce available, some of which has recently been in glut supply.

PERSONAL

MAJOR KENNETH GORDON, who is to be this year's recipient of the Institute of Fuel's Melchett Medal, will, on October 1, deliver a lecture on "Hydrogenation in the Fuel and Chemical Industries," when he will also receive the award from the president of the Institute.

Maj. Kenneth Gordon

DR. H. BUCKLEY, who has been appointed in charge of the Scottish office of the D.S.I.R., is a graduate of Manchester University. He was on the staff of Toronto University before serving for 25 years on the staff of the National Physical Laboratory, where his special field of research was concerned with photometry and illumination. During World War II he was for a time a liaison officer in the British Commonwealth Scientific Office in Washington and, during the last three years, was a member of the Intelligence Division at the department's headquarters.

DR. J. A. SMITH, lecturer at Glasgow University in applied chemistry with special reference to nutrition, has been appointed deputy director of the Hannah Dairy Research Institute, Ayr. Dr. Smith was on the staff of the Hannah Institute for ten years, being appointed research assistant in biochemistry in 1936. He began his research career at Birmingham University and continued it at University College and the Imperial College of Science, London. Later he was lecturer in biochemistry at Liverpool University.

PROF. CHAO-LUN-TSENG, Professor and head of the Department of Chemistry at the National Peking University since 1931, arrived in London on September 2 for a three-month visit at the invitation of the British Council. The professor, who was president of the Chemical Society of China from 1935 to 1937, is editor-in-chief of the *Journal* of the Chemical Society and the author of numerous books and articles on chemistry and kindred subjects.

MR. D. E. FLAHERTY has been appointed a director of Guest Industrials, Ltd., and technical manager of the Raw Materials Division. MR. RALPH BYFIELD has been appointed sales manager.

DR. H. N. RYDON has been appointed to the University Readership in Organic Chemistry at Birbeck College, London, with effect from October 1.

MR. K. S. BURCH and MR. C. H. SWEDLER have been appointed directors of The Chemical Supply Co., Ltd.

DR. L. H. LAMPITT, president of the Society of Chemical Industry, who is at present in Canada, addressed the Canadian Section of the Society at a luncheon on September 8.

MR. L. J. GENT has resigned from his post of works manager and chief chemist of the United Phosphate and Malt Co., Ltd., to devote more time to his work as a food technology consultant.

OBITUARY

MR. ANDREW HENDERSON, a former lecturer in chemistry at Glasgow University, has died at Dalry, Ayrshire. Sixty-nine years of age, Mr. Henderson was educated at Glasgow University. After taking his Arts degree in 1901 and his B.Sc. in 1906, he was appointed assistant to the Professor of Chemistry before becoming a lecturer in organic chemistry in 1921. He retired from the university in 1943.

DR. PAUL MAUTNER, who came to this country from Czechoslovakia in 1939 and later became a British subject, has died in his native country at the age of 46. Dr. Mautner was well known in this country as a research chemist for British Industrial Solvents, Ltd., for whom he undertook the development of many valuable processes during the war.

Manufacturer Leaves £23,550

MR. J. F. BOTTOMLEY, the former head of J. C. Bottomley and Emerson, Ltd. (chemical manufacturers), who died last April, left net personalty £23,550.

Home News Items

British Association Meetings.—The 1949 meeting of The British Association will be held at Newcastle-on-Tyne, and the 1950 meeting in Birmingham.

Institution of Chemical Engineers.—Application forms for the 1948 examination for associate membership can be obtained from the hon. registrar of the Institution at 56 Victoria Street, Westminster, S.W.1.

Faraday Society Discussion.—A general discussion on "The Labile Molecule" has been arranged by The Faraday Society, to take place in the Physical Chemistry Laboratory, Oxford, from September 23-25.

Retail Sales.—Relatively little change occurred in the level of retail sales in June and July last. Board of Trade figures just issued give as sales index for July 142, against 139 in the previous month. Chemists' sales increased in all areas—by 18.2 per cent in the South of England.

Lime Subsidy Continued. — Farmers throughout the U.K. will continue for a further term of five years to receive the subsidy of 50 per cent of the cost of buying and transporting lime for agricultural purposes, states an announcement by the agricultural authorities of the U.K.

Unilever "Stagger" Plan.—With effect from Monday last, the 2700 staff of Unilever House, E.C., will work from 8.45 a.m. until 5.15 p.m. instead of from 9 a.m. until 5.30 p.m. This is the outcome of conversations between Unilever and Lever Bros. and the City of London Local Transport Group.

Foreign Travel Allowance.—Announcing the reduction of the allowance of currency for necessary business purposes in Europe and the Mediterranean areas from £10 to £8 per day, the Treasury states that "Applications for exchange to go abroad for good professional reasons or to participate in conferences of reputable international bodies . . . will be considered on their merits."

Raw Materials Division.—Harris & Dixon, Ltd., and Guest Industrials, Ltd., have jointly announced the formation of a Raw Materials Division, within Guest Industrials, Ltd., to co-ordinate and develop the marketing of the wide range of chemicals, colours and minerals at present being produced and distributed by their various associated and subsidiary companies. The address is Guest Industrials, Ltd. (Raw Materials Division), 81 Gracechurch Street, London, E.C.3. Telephone: Mansion House 5631 (16 lines).

U.K. Tin Stocks.—Stocks of tin metal in Ministry of Supply hands at July 31 amounted to 5687 long tons, 3935 tons being with consumers.

15,413 Visitors.—Attendance at the "Enterprise Scotland" exhibition reached a peak on Saturday, August 30, when 15,413 people passed the turnstiles. The average daily attendance was about 11,000.

Accommodation for I.C.I. Workers.—Northwich Rural Council is to erect 100 aluminium bungalows for I.C.I. workers, the project being scheduled for completion by the end of the year. I.C.I. is understood to have agreed to make a contribution to the rate fund of £4 10s. per dwelling for 60 years.

Streptomycin Tests Encouraging.—The Ministry of Health has announced that tests made with streptomycin have been sufficiently successful to warrant supplies being made available to patients suffering from tuberculous meningitis or miliary tuberculosis.

Resin Store Fire.—A store containing five tons of resin and 4000 tins of grease was destroyed by fire at Dussek Brothers, Ltd., oil refinery, London Road, Crayford, on September 2. The N.F.S., using thousands of gallons of foam, prevented the flames from spreading to the main building.

Chemistry of Oils and Fats.—A post-graduate course of eight lectures on "The Modern Chemistry of Oils and Fats" is to be given by Dr. J. H. Skellon at Chelsea Polytechnic. They will be given weekly on Fridays commencing on October 24 at 7.30 p.m.

Port Sunlight Fire.—Prompt action by workmen on the spot, and by the works' fire brigade and N.F.S. units, on September 3, quickly checked a fire which involved bags of coconut cake meal in the seed crushing mill warehouse at Lever Bros., Port Sunlight works. Damage was slight and confined to bags.

Tin Producers Penalised

"It seems most inequitable that those (tin) producers who strained every nerve and in many cases seriously depleted their richer ore reserves in order to further the war effort should, more than two years after the cessation of hostilities, be subject to an arbitrarily controlled price for their product."—Mr. Ernest V. Pearce, chairman and managing director of Consolidated Tin Smelters, speaking at the annual meeting of the company last week.

Overseas News Items

Shell in Pakistan.—The Shell group of companies has formed two new subsidiaries in Pakistan—The Shell Company of Pakistan, and the Burmah-Shell Oil Storage and Distribution Company.

New Products of Merseburg Bunaworks.—The chemical works Buna-Schkopau, near Merseburg, Eastern Zone, has extended its production programme to include, besides various Buna products, the manufacture of acetic acid, lime and glysantine.

Phosphate Workers Strike.—Some 12,000 phosphate workers are among the leading elements in the 24 hour strikes to protest against the reduction of the bread ration from 8½ oz. to 7 oz. daily which was paralysing production early this week in several French industrial centres.

Further U.S. Alkali Price Increases Expected.—It is expected that all leading manufacturers of alkalis in the United States will increase their prices because of higher costs. The Solway Corporation has already increased its prices by 10 to 25 cents per 100 lb., effective from the beginning of October.

U.S. Firms to Participate in Dutch Industry.—An increasing number of American concerns is reported to be seeking participation in Dutch enterprises. For instance, a well-known U.S. chemical company, which specialises in the manufacture of products required in dyestuffs production and in the manufacture of textiles, leather, etc., has signed an agreement with the N.V. Chemical Factories Serve, of Delden.

Chemical Raw Materials for U.S.S.R. Zone.—It is reported that foreign trade in the Soviet occupation zone of Germany has increased considerably in the course of last year. Coal has been received from Poland as raw material for the chemical industries, phosphates have arrived from North Africa, superphosphates from Holland and pyrites from Norway, while Switzerland sent dyestuffs. Exports consisted chiefly of finished products, mainly glassware.

Guano Production in Chile.—According to a report of the Cia. Administradora del Guano, Peru, the production of this fertiliser during 1946 amounted to 113,536 tons, the highest total recorded for the past five years. For ten years, however, the requirements of guano by national agriculture have been far in excess of production. Chile may be in a position to export cement to the extent of about 50,000 tons per annum, as national production of this material is said to exceed local requirements.

Canada's Chemical Imports.—Canada's total imports in January-May were valued at $1,025.7 million (against $722.2 millions in the same period of 1946) and included $48.6 million for chemical and allied products ($39.3 million in 1946).

British Trade Representatives in Japan.—A representative each from Imperial Chemical Industries, the shipping concern of Mackinnon, the Pekin Syndicate, and Liptons, reached Japan last week on what is described as an "exploratory trade mission."

Portuguese Wolfram Ban Lifted.—The Portuguese Government's ban on the export of wolfram which came into effect in June 1944, and which brought mining of the metal to a complete standstill, has been lifted. Production this year already amounts to 625 tons.

U.S. to Build Egyptian Factories.—A number of factories for the production of chemicals, electrical equipment, textiles and canned food are to be erected in Egypt by five U.S. concerns. The present project, it is reported, will cost the Egyptian Government between 10 and 20 million dollars.

German Lead Mines Resuming Production.—The Eiffel Lead Mines at Mechernich, have been given general permission to resume production. During and before the war the works supplied the chemical and accumulator Industry. The Schildergasse mines near Wenden, British Zone, are now preparing for the exploitation of lead and zinc deposits in the southern part of Westphalia.

U.S. Native Sulphur Production.—According to the U.S. Bureau of Mines, a record production of 377,218 long tons of native sulphur was produced in that country during May, 1947. In the first five months of the year, production was 14 per cent greater than in January-May of 1946, and sales exceeded output. At the end of May, stocks had decreased by 274,357 long tons since the first of the year and were lower than they have been since 1937.

Soda Ash Duty Concession.—Imports of soda ash, which the Indian Government at one time hoped would be produced internally on an adequate scale, are still to be permitted. Rebates of the import duty have been granted from time to time since 1935. The last extension, which was due to expire on June 22 last, is to be continued until December 31, 1948, subject to possible review in the event of home production becoming greatly increased.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

SANODA LTD., Salford, manufacturing chemists. (M., 13/9/47). July 29, £5000 debenture, to A. S. Baxter, Salford; general charge.

GOLDEN VALLEY CHEMICAL WORKS LTD., Stroud. (M., 13/9/47). August 1, series of £3000 (not ex.) debentures, present issue £1000; general charge.

GRANTO LABORATORIES LTD., London W.C. (M., 13/9/47). August 1, £2000 Land Registry charge, to T. C. Brookes, London, and another, and £500 Land Registry charge, to T. C. Brookes, London, and another; charged on properties. *£4607. December 30, 1946.

Company News

The name of **Teign Valley Charcoal, Ltd.**, Glastonbury, has been changed to Torvex Peat, Ltd., as from August 13, 1947.

Lime Shares Acquisition.—The entire shares in Beswick's Limeworks, near Buxton have been acquired by Staveley Coal and Iron Company.

The name of **Wrentnall Baryta Company, Ltd.**, 95 Gresham Street, London, E.C.2, has been changed to Angela Austral Mines, Ltd., as from August 15, 1947.

The nominal capital of **Watford Chemical Company, Ltd.**, 17 Half Moon Street, London, W.1, has been increased beyond the registered capital of £10,000, by £50,000, in £1 ordinary shares.

The nominal capital of **Potash, Ltd.**, Fenton House, Fenchurch Street, London, E.C.3, has been increased beyond the registered capital of £10,000, by £40,000, in £1 ordinary shares.

The nominal capital of **C. M. Milligan and Clarke, Ltd.**, chemical manufacturers, etc., 4 Golden Square, London, W.1, has been increased beyond the registered capital of £1000 by £4000 in £1 ordinary shares.

The nominal capital of **Antigen Laboratories, Ltd.**, chemical and biological manufacturers and bacteriologists, etc., 95 Great Portland Street, London, W.1, has been increased beyond the registered capital of £5000, by £10,000, in 4000 participating preference and 6000 ordinary shares of £1.

Pharmaceutical Supply (London) Ltd. (441,607).—Private company. Capital £300 in £1 shares. Manufacturers of and dealers in chemical and other similar products, etc. Subscribers: E. E. Rogers and R. J. Hulse. Mrs. Edith E. Rogers, of 26 Meadow Way, Littlehampton, Sussex, is the first director.

Wm. Neale & Son (St. Helens), industrial, chemical and structural engineers, is recommending payment of a 6d. dividend per 2s. ordinary share, or 25 per cent, less tax, for the year ended March 31, as against 5d. or 20 5/6d. per cent, less tax, last year. This year's trading profit is £71,431, last year's being £50,773.

The Distillers Company Limited has announced a net profit of £3,428,719 for the year ended March 31, as compared with £2,574,760 last year. A final dividend on the ordinary stock of 2½ per cent, less income tax, which with the interim dividends already paid, makes the dividend for the period of 22½ per cent, less income tax, has been recommended. A special dividend on the ordinary stock of 2½ per cent, less income tax, is also proposed.

New Companies Registered

Springham Chemicals, Ltd. (441,173).—Private company. Capital £1500 in 1500 shares of £1 each. Chemists, chemical manufacturers, manufacturers of and dealers in photographic requisites, etc. Subscribers: S. Hawkins and Evelyn I. Chant. Registered office: 1 Budge Row, E.C.

Powerlube Laboratories, Ltd. (441,647).—Private company. Capital £1000 in £1 shares. Manufacturers, producers, distillers and importers of and dealers in oils, lubricants, greases, etc. Directors: Capt. Cranville Burgess and W. D. Hall. Registered office: 3 Albemarle Street, W.1.

Chemical and Allied Stocks and Shares

DESPITE the coal strike news, stock markets rallied at the beginning of the week, hopes apparently being centred on the possibility that American aid to Europe may be accelerated. Best levels were not held, but no heavy selling developed; although as the week progressed, there was an increasing tendency to await the next instalment of the Government's crisis plans, more particularly the new export schedules and priorities, which must have an important bearing on the outlook for many industries. In contrast with the better tendency in industrial shares, British Funds were dull

and lower on balance, although generally the volume of business remained on moderate lines.

As was to be expected shares of chemical and kindred companies moved closely with the prevailing market tendency and in most instances have rallied well, although best levels were not held. Imperial Chemical were better at 44s. 6d., partly on talk that an increase may be made in the interim dividend; but this is not generally expected. Monsanto Chemicals were also higher at 52s. 6d. after an earlier decline. W. J. Bush were 90s. and B. Laporte 87s. 6d., with Lawes Chemical 10s. shares around 13s. William Blythe 3s. shares 15s., and British Glues & Chemicals 4s. ordinary at 18s. 9d. regained all but a small part of an earlier fall. Greeff-Chemicals Holdings 5s. ordinary marked 15s. 6d. and dealings in Fisons ranged from 59s. to 62s. 6d. Borax Consolidated recovered to 48s. 1½d. and in anticipation of the consolidated accounts and hopes of a higher relative price for the ordinary units when they are "split" into five units of 4s. each, Distillers strengthened to 128s. 9d. Lever & Unilever eased to 48s. 3d. following the annual meeting, but there was a rally to 71s. in Turner & Newall. United Molasses, partly in view of the company's tanker fleet interests, came in for attention and rallied well to 45s. 7½d. British Aluminium were 41s. 6d., British Oxygen 88s. 9d., and there was a rally in paint shares, Goodlass Wall being 34s. 3d., Pinchin Johnson 53s. 9d., and International Paint £6½d.

Iron and steel shares appeared to derive some encouragement from the Government's decision not to introduce a Bill for nationalisation in the next Parliamentary session. In some quarters it is being suggested that nationalisation of iron and steel may in fact have to be abandoned. It is pointed out in the City that in any case iron and steel shares seem moderately valued, because a fair compensation basis in the event of nationalisation would in most cases be well above current market prices. Moreover, unless there is a serious fuel crisis in the winter it should be possible to maintain dividend payments and with few exceptions yields on this basis are generous. United Steel were better at 23s. 9d., with Dorman Long 24s. 3d., Colvilles 24s. 6d., and Guest Keen 42s. 3d. Elsewhere, Babcock & Wilcox improved to 63s. 6d., with Thomas & Baldwins 12s. 3d., Stewarts & Lloyds 46s. 3d., and Tube Investments £5⅞.

Textiles have been helped by anticipations of higher export targets, and Courtaulds and other rayon shares rallied for a similar reason. Boots Drug improved to 53s. 3d., Sangers were 27s. 6d., Beechams deferred better at 22s. and Timothy Whites 29s. 6d. Griffiths Hughes improved to 42s. 6d. Oil shares rallied strongly after an earlier decline, but later reacted again, Anglo-Iranian being £8¾ with Shell 85s. 7½d. Burmah Oil 75s. 7½d. and V.O.C. 79s. 4½d.

British Chemical Prices

Market Reports

A STEADY demand and a firm price structure characterises most sections of the industrial chemicals market. No major changes have been reported during the past week and the general position so far as supplies are concerned remains much the same with deliveries to the chief consuming industries proceeding reasonably satisfactory. The demand for pitch, both for home trade and for export, has been good, and other sections of the coal tar products market are as active as the supply position permits.

MANCHESTER.—The Yorkshire coal stoppages are increasing the difficulties of some of the chemical-consuming industries in the Lancashire area and of chemical manufacturers themselves. On the Manchester chemical market during the past week, however, a steady demand for a wide range of products has been reported and there is a persistent call for contract deliveries from the Lancashire and Yorkshire textile trades and from other industrial users. Export inquiries have again also been in evidence. The demand for fertiliser materials is improving, while among the by-products there is a steady absorption of supplies of crude tar, creosote oil, benzole and other descriptions.

GLASGOW.—In the Scottish chemical market business has been normal in the past week with little outstanding to report. With the continued shortage of caustic soda and soda ash, it has been reported that black market activities in these materials are ever increasing. It is to be hoped that the appropriate authorities will be able to stop or at least reduce considerably the supplies reaching unauthorised sources. Considering the difficulty which bona fide firms engaged chiefly in the manufacture for export are experiencing in obtaining these materials, necessity for taking action energetically is obvious.

In the export market this has been a very satisfactory week and a number of large orders have been booked. One result of the sterling convertibility reduction has been an increase of interest in British chemicals in India. Our prices previously, were not competitive with American prices, although it is interesting to note price of many materials from this country are cheaper c.i.f. India than the same materials produced in India. The general outlook in the export market is satisfactory, but it would be of great assistance in securing orders if something could be done to reduce the cost of bags and drums.

TIME and MOTION

A Study For The Office As Well As The Factory

The bigger the business, the greater the need for economy of man-power.

Man-power is the most expensive item in any business overhead.

That is why most progressive businesses embody time-and-motion-study experts.

But more in the factory than in the office.

Yet where is more time wasted than in any average office? Or where is the pay-per-hour relatively highest?

Look around you now: how many people are busily occupied on non-productive work? Searching for something. Checking facts. Finding information.

There are many euphemisms. But lost man-minutes, by any name, cost just as much.

What is the solution?

Visibility! Keeping everything within "eye-shot." Seeing what you want as soon as you want it. Not searching, digging, thumb-fumbling.

How? With Shannograph. With this one and only flat-top filing system that brings complete visibility to all branches of business.

Inside the folders (each metal suspended) are all the collated correspondence or documents. On the full-width flat-top is the story of their progress — VISIBLE AND COLOUR CHARTED.

And this applies to any department: sales, accounting, advertising, export, etc., etc. "Shannographics" is a fundamental commercial science that can be applied to every department of modern business.

We'd like to get one of our Consultants to show you how. Meantime, may we send you further particulars?

Don't bother to write-merely send your letter-heading to the address below for full information.

Shannon Systems

SOLVE THOSE SEARCHING PROBLEMS

THE SHANNON LIMITED

528, Shannon Corner, New Malden, Surrey

E

Specify

B.D.H.

LABORATORY CHEMICALS

Their exceptional reliability and high standard of quality are recognised throughout the world. The range includes—

ORGANIC AND INORGANIC FINE CHEMICALS

'AnalaR' REAGENTS

ADSORPTION, OXIDATION-REDUCTION AND *p*H INDICATORS

MICROSCOPIC STAINS AND STAINING SOLUTIONS

MICRO-ANALYTICAL REAGENTS

REAGENTS FOR CLINICAL ANALYSIS

FINE CHEMICALS for INDUSTRY

THE BRITISH DRUG HOUSES LTD.

B.D.H. LABORATORY CHEMICALS GROUP

POOLE **DORSET**

Telephone: Poole 962
Telegrams: Tetradome Poole

LabC/6

Patents in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Complete Specifications Open to Public Inspection

Manufacture of carbonaceous fuels.—A. R. Schlumberger. December 21, 1945. 37588-89/1946.

Method for increasing the resistance of stainless steel devices to sulphuric acid.—Soc. d'Electro-Chimie d'Electro Metallurgie et des Acieries Electriques d'Usine September 15, 1945. 27610/1946.

Process for the recovery of petroleum oils from shale and the like.—Standard Oil Development Co. April 17, 1943. 17372/1947.

Resinous compositions and methods of applying the same to fibrous materials.—Stein Hall & Co., Inc. September 28, 1945. 27470/1946.

Dicarbamates and polymers thereof.—Wingfoot Corporation. January 16, 1946. 15556/1946.

Hydrazo esters.—Wingfoot Corporation. January 16, 1946. 18111/1946.

Azo esters.—Wingfoot Corporation. January 16, 1946. 18300/1946.

Method of stabilising an aqueous solution of ascorbic acid (Vitamin C).—Abbott Laboratories. Feb. 4, 1946. 22876/1946.

Process for the recrystallisation of melamine.—Ciba, Ltd. Feb. 8, 1946. 2134-36/1947.

Method of producing antisera of high strength.—Ciba, Ltd. Feb. 8, 1946. 3409-10/1947.

Process for removing metal oxides or metal salts from heavy metal surfaces and cleaning preparations therefor.—Ciba, Ltd. Feb. 8, 1946. 3411-12/1947.

Manufacture of primary alcohols.—Ciba, Ltd. Feb. 6, 1946. 3558-60/1947.

Beta - amylose - iodine compound and methods for the production of same.—Claimint Chemical Co., Inc. May 28, 1943. 19793/1947.

Ferrous alloy.—Coast Metals, Inc. July 16, 1942. 19769/1947.

Manufacture of silica gels.—Davison Chemical Corporation. Feb. 6, 1946. 36375/1946.

Mould lubricants.—Dow Chemical Co. Feb. 7, 1946. 2541/1947.

Organo-silicon halides.—Dow Chemical Co. Feb. 4, 1946. 2542/1947.

Composition of matter.—Dow Chemical Co. Sept. 19,1946. 16192/1947.

Preparation of ethylene diamine.—E.I. Du Pont de Nemours & Co. Feb. 5, 1946. 3389/1947.

Manufacture of carbon dioxide-modified polymers of ethylene.—E.I. Du Pont de Nemours & Co. Feb. 5, 1946. 3390/1947.

Manufacture of polymerisation products of ethylene.—E.I. Du Pont de Nemours & Co. Feb. 5, 1946. 3391/1947.

Adhesive compositions and products formed therewith.—E.I. Du Pont de Nemours & Co. Feb. 9, 1946. 3664/1947.

Copolymers of acrylic nitriles with lesser amounts of conjugated dienes.—B. F. Goodrich Co. Jan. 27, 1940. 19740/1947.

Process for the production of penicillin.—Heyden Chemical Corporation. July 12, 1945. 33853/1946.

Aryl sulphide compounds and process for their manufacture.—A. D. Macallum. Feb. 4, 1946. 2985/1947.

Chemical manufacture.—Mathieson Alkali Works. Feb. 5, 1946. 442/1947.

Alpha-acylamide acetic ester compounds.—Merck & Co., Inc. Feb. 9, 1946. 2396/1947.

Production of glycols and polyglycols from olefinic oxides.—Montecatini Soc. Generale per l'Industria Mineraria e Chimica. July 16, 1941. 18393/1947.

Production of anthacene derivatives particularly for use as plasticisers.—Neville Co. Feb. 2, 1946. 34677/1946.

Method of converting hygroscopic fertilisers composed of hydrous calcium nitrates into little hygroscopic fertilisers.—Office National Industriel de l'Azote. Feb 8, 1946. 3770/1947.

Method for the continuous making of copper oxide.—Progil & Cie de Produits Chimiques et Electrometallurgiques Alais Froges & Carmargue. Feb. 4, 1946. 3230/1947.

Mineral oil composition.—Socony-Vacuum Oil Co., Inc. June 9, 1944. 18726/1947.

Treating hydrocarbon oils to reduce the sulphur content thereof.—Socony-Vacuum Co., Inc. Oct. 28, 1942. 20887-88/1947.

Process for the manufacture of cellulose esters.—Soc. Rhodiaceta. Feb. 8, 1946. 3222/1947.

Extreme pressure lubricants.—Standard Oil Development Co. Dec. 26, 1942. 16489/1943.

Use of fluid catalyst technique in hydrogen production.—Standard Oil Development Co. Jan. 8, 1941. 18513/47.

Process for burning lime.—Standard Oil Development Co. Jan. 1, 1943. 19664/1947.

Method of producing alpha-naphthoquinones, and the improved alpha-naphthoquinones resulting therefrom.—Velsicol Corporation. Oct. 16, 1943. 19752/1947.

Removal of sulphur compounds from materials containing same, and apparatus therefor.—K. Williams. Feb. 4, 1946. 1151/1947.

Production of antibiotic agents.—Abbott Laboratories. Feb. 14, 1946. 2692/1947.

Surface treatment of aluminium and aluminium base alloys.—Aluminium Co. of America. Oct. 14, 1940. 19760/1946.

Production of uniform matt finishes on aluminium surfaces.—Aluminium Co. of America. March 31, 1943. 2168/1947.

Ammonium nitrate explosives. — Atlas Powder Co. November 16, 1943. 19450/1947.

Ammonium nitrate containing explosive assemblies.—Atlas Powder Co. Dec. 26, 1944. 19451/1947.

Oxidation of sulphur dioxide to sulphur trioxide and catalysts therefor.—Baker & Co., Inc. May 23, 1942. 12960/1944.

Catalysts.—Baker & Co., Inc. April 11, 1942. 14754/1944.

Compositions comprising plastic polymerised chloroprene.—B.B. Chemical Co., Ltd. Jan. 31, 1940. 20027/1947.

Polymerisation.—British Celanese, Ltd. Nov. 13, 1945. 33464/1946.

Amination reactions.—British Celanese, Ltd. Feb. 14, 1946. 4079/1947.

Dyestuff intermediates.—British Celanese, Ltd. Feb. 15, 1946. 4181/1947.

Manufacture of vat dyestuffs of the anthraquinone series.—Ciba, Ltd. Feb. 12, 1946. 3948-49/1947.

Ferrous alloy. — Coast Metals, Inc. Aug. 3, 1940. 19505-6/1947.

Process of producing a colloidal lead iodide.—A. Dinsley. June 10, 1940. 19160/1947.

Reducing ferric oxide.—Dorr Co. Sep. 15, 1944. 18880/1947.

TRIBASIC PHOSPHATE OF SODA
Free Running White Powder
Price and sample on application to :
PERRY & HOPE, LIMITED, Nitshill, Glasgow

S. GARCIA
begs to announce that he is available to carry out
REPAIRS & MAINTENANCE
of
Chemical, Analytical and Assay Balances
at his new premises at
780 SEVEN SISTERS RD., TOTTENHAM, N.15
Tel: STAmford Hill 1781

J. M. STEEL & Co., Ltd.

Abrasives	Dehydrated Castor Oil	Polishing Rouge	Sodium Sulphate desiccated
Acidproof Cements	Diammoniumphosphate	Potassium Bichromate	Solvents
Antioxidants	Ethyl Cellulose	Preservatives for Glues, etc.	Strontium Salts
Asplit Impervious Cement	French Chalk	Resins (synthetic)	Synthetic Glues
Barytes Substitute	Lead Nitrate	Rubber Accelerators	Talc
Carbonate of Potash	Manganese Borate	Sodium Acetate	Temperature Indicating Paints and Crayons
Caustic Potash (all grades)	Methyl Cellulose	Sodium Bichromate	Thio Urea
Cellulose Adhesives	Methylene Chloride	Sodium Chlorate	Wax Substitutes
Coumarone Resin	Oxalic Acid and Salts	Sodium Nitrate	Wood Flour
Cryolite (Synthetic)	Plasticisers	Sodium Nitrite	Zinc Chloride, Etc., etc.

Head Office : "Kern House" 36/38, Kingsway, LONDON, W.C.2
Branch Office : 51, South King Street, MANCHESTER 2.
Telephone: Holborn 2532-3-4-5 Blackfriars 0083/84

EDUCATIONAL

Great Possibilities for
QUALIFIED CHEMICAL ENGINEERS

VAST and far-reaching developments in the range of peacetime productions and markets of the Chemical Industry mean that the profession of Chemical Engineering will be of great importance in the future and one which will offer the ambitious man a career of outstanding interest and high status. The T.I.G.B. offers a first-class training to candidates for the Chemical Engineering profession.

Enrol with the T.I.G.B. for the A.M.I.Chem.E. Examinations in which home-study students of the T.I.G.B. have gained a record total of passes including—

FOUR "MACNAB" PASSES
and
THREE FIRST PLACES

Write to-day for the "Engineers' Guide to Success"—free—containing the world's widest choice of Engineering courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E., A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE
OF GREAT BRITAIN
219, Temple Bar House, London, E.C.4

SITUATIONS VACANT

PLANT Chemists urgently required for Process Plant Operation by large company operating in the Middle East. Applicants need not be Graduates but should have had a chemical training up to Inter. B.Sc. or National Certificate Standard with experience of shift work in either a gas, coke oven or chemical works. Age not over 30. Salary in sterling between £540 and £600 per annum, plus generous allowances in local currency, with free furnished bachelor accommodation, passages out and home, medical attention, also kit allowance and Provident Fund benefits. Apply, stating age, qualifications and experience, etc., to Dept. F.22, Box No. 2435, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

RESEARCH Chemist required by tar distillation and oil refinery company near Birmingham. Degree in Chemistry essential; few years' industrial research experience essential. Apply, stating age, experience and salary required, to Box No. 2523. THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SALES Manager. Applications are invited for this important position, for which consideration will only be given to first class men of experience in this capacity with a thorough knowledge of graduated volumetric and lampblown laboratory apparatus and chemical thermometers. Knowledge of languages a distinct advantage as duties will necessitate personal visits and correspondence with overseas customers. Write in confidence giving full details of experience and salaries earned to the MANAGING DIRECTOR, H. J. Elliott Ltd., Treforest Trading Estate, Glam.

SHIFT SUPERINTENDENT required for Chemical Works in the Midlands. Experience with acids and gases under pressure desirable. Apply Box No. 2524, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

TECHNICAL Representative for specialised Chemical Engineering process, education to at least Higher School Certificate required. Excellent prospects for hard, conscientious worker with established company. Permanent appointment in Central London office with travel in Great Britain. Age preferred 25 to 35. Generous salary and all expenses. Box No. 2521, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WANTED, Young Chemical Engineer capable of planning process work and chemical works layout. Apply giving particulars of age, experience and qualifications. Works situated in North Midlands. Apply Box No. 2528, THE CHEMICAL AGE, 154 Fleet Street, London, E.C.4.

SITUATION VACANT

YOUNG Chemical Engineers are invited to apply for a position of interest and opportunity in the Technical Department of the Lafarge Aluminous Cement Co., Ltd., Experience in Civil Engineering, or Building Science, and a special knowledge of Physical Chemistry would be advantageous. The successful applicant is destined to take charge of the experimental and development section. Commencing salary about £600 per annum, according to qualifications. Pension scheme in operation. Reply in writing in first instance to 73, Brook Street, London, W.1.

FOR SALE

MIXERS FOR SALE

2 ft. by 2 ft. by 2 ft. 6 in. deep Horizontal Unjacketed **TROUGH MIXER** by **J. HUNT.** Sheet metal body with C.I. ends; two bow-type agitators. Mixer arranged for hand-wheel-operated tilting and is complete with hinged lid. Drive is through gearing from fast and loose pulleys, 24 in. dia. by 3½ in. face. Unit mounted in heavy C.I. frame.

Double "L"-bladed Steam Jacketed **TROUGH MIXER** by **KRUPP.** Approx. 5 ft. by 5 ft. by 5 ft., together with 50 h.p. D.C. motor by British Westinghouse, 460 volts, 600 r.p.m., with Brookhirst-type "G" starter.

Horizontal Steam Jacketed **TROUGH MIXERS** by **GARDENERS OF GLOUCESTER.** Dimensions, 5 ft. by 4 ft. by 4 ft.; hand-wheel operated, slide bottom outlet mixers complete with steel covers and feed grill. Glanded ribbon type agitator running in ball bearings, arranged for direct drive from electric motor (motor not included) through machine-cut gear and pinion.

Three Horizontal Steam Jacketed **TROUGH MIXERS** by **PORTEOUS,** 8 ft. by 3 ft. by 3 ft. 3 in.; hand-wheel operated, slide bottom outlet. Mixers complete with glanded ribbon type agitator, running in ball bearings, arranged for direct drive from electric motor (motor not included) through machine-cut gear and pinion.

Enclosed Horizontal Cylindrical **MIXING MACHINE** by **HANDS OF BIRMINGHAM.** Cast-iron sectional construction. Approx. 8 ft. 6 in. long by 4 ft. 6 in. dia., mounted in "A" frames. Paddle agitator driven by fast and loose pulley through gearing.

Horizontal Double-trough **PUG MIXER** by **HARRISON CARTER.** Approx. 5 ft. by 2 ft. 4 in. by 1 ft. 6 in. deep; extended top section; totally enclosed, approx. 12 in. deep, fitted with twin agitator complete with driving gear.

Horizontal Combination **PUG MIXER AND DRYER,** fitted with steam jacket. Dimensions approx. 3 ft. by 2 ft. 4 in. by 1 ft. 6 in. deep, with heavy twin agitators complete with driving gear.

GEORGE COHEN SONS & CO., LTD.,
SUNBEAM ROAD, N.W.10, and STANNINGLEY, near LEEDS.

AUTOCLAVE, vertical, cast steel 39 in. I.D. by 5 ft. 6 in. deep, not jacketed, bolted cover, high pressure, as new £80. THOMPSON & SON (Millwall) Ltd., Cuba Street, Millwall, London, E.14.

NEW AND SECONDHAND PLANT

Send your specific enquiries

to

REED BROTHERS
(ENGINEERING) LTD.

Chemical Plant Department,
Bevis Marks House,
London, E.C.3.

'Phone: AVEnue 1677/8

FOR SALE

MORTON, SON & WARD LTD.

OFFER

HYDRO EXTRACTORS.

THREE— 48-in. all-electric latest type Underdriven Machines by Broadbent, with perforated steel cages of the lift-out type, each machine complete with spare basket and lifting yoke; electric interlocking covers, fitted sight glasses; all electric gear wound for 400/3/50 cycles.

FOUR—36-in. all-electric Underdriven Machines by Broadbent. Similar specification to above, but without spare baskets.

SIX—36-in. all-electric Machines by Broadbent. Similar specification to above, but arranged under-belt-drive from self-contained motor and centrifugal clutch.

TWO—36-in. Under-belt-driven Machines by Broadbent. Latest type, as above, but without driving motor.

ONE—New and unused All-Electric 30-in. Machine by Broadbent; under-belt-driven, with self-contained motor and centrifugal clutch; motor wound 400/3/50 cycles.

ONE—30-in. all-electric Overdriven Machine by Broadbent, with self-discharging suspended basket; motor wound 500 volts D.C.

ONE—26-in. Under-belt-driven Machine by Cherry Tree Machine Co. Galvanised basket.

ONE—60-in. Steam-driven Machine by Broadbent, with vulcanite lined basket.

SIX—Latest type 20-in. Under-driven Machines by Manlove-Alliott, with self-contained motors, 400/3/50 cycles.

MORTON, SON & WARD LTD.,
WALK MILL, DOBCROSS, Nr. OLDHAM, LANCS.
'Phone – Saddleworth 437.

CHARCOAL, ANIMAL and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hill-Jones, Bochurch, London." Telephone: 3285 East.

ELEVEN open-ended cylinders, 8 ft. 3 in. by 3 ft. 9 in. dia., ⅜ in. plate, external stiffening rings, suitable for conversion to tanks. THOMPSON & SON (MILLWALL) LTD., Cuba Street, London, E.14.

METAL Powders and Oxides. Dohm Limited, 167 Victoria Street, London, S.W.1.

NEW Stainless Steel Vertical Cylindrical Tanks, 25, 50 and 100 gallon capacity, either with handles, or mounted in rubber castored cradle.
Also Stainless Steel Water-jacketed Pans with similar capacity, arranged for heating by water, oil, gas, electricity or steam.
Also Mild Steel Jacketed Pans for 50 lb. and 80 lb. working pressure, 20/300 gallons capacity.
DELIVERY from stock.
Wanted to purchase second-hand chemical plant—best prices given.

THE MANICRAFT ENGINEERING COMPANY LIMITED
Pryme Street Mills, off Chester Road, Hulme, Manchester, 15.

Phone: 98 Staines.

OVAL-JACKETED Vacuum Oven, 7 ft. by 4 ft. 6 in. by 2 ft. 6 in.
Jacketed Vacuum Mixer, 19 in. by 19 in. by 16 in. deep.
20-in. Broadbent Electric Hydro, 415/3/50.
26-in. Belt Driven Hydro Extractor.
6 Wood Rectangular Tanks up to 500 galls.
2 Earthenware Stainless Mixers, 250 galls.

HARRY H. GARDAM & CO. LTD.
STAINES.

FOR SALE

2 Vertical Stearine Presses
1 Hydraulic Baling Press
1 Shirtliffe Baling Press
48 in. Belt-driven Hydro
42 in. Under-driven Hydro
Jacketed Mixing Pan, 7 ft. dia., 9 ft. deep
7 various Filter Presses
Ball-bearing Gravity Conveyor, 6 in. pitch 14 in wide 8 ft. lengths
12 Vertical Weir & Hall Steam Pumps
Several small Steam-jacketed Copper Pans
Plant and Frame Filter Press, 19 in. square
Three C.I. Sectional Tanks
Several Ball Mills, 6 ft. 6 in. by 6 ft. 8 in., Silex-lined batch type, with driving gear and clutch
Porteous size 3 Grinder with Motor
Two set 2-pair high Breaking Rolls, 33 in. long
One 18-in. 4-roll Cake Cracking Mill
One 36-in. dia. Swan Neck Hydro Extractor
Five Large Filter Presses
Rectangular Storage Tank, 128-tons capacity
Ditto, 108-tons capacity
Ditto, 62-tons capacity
Sectional ditto, 16-tons capacity
3 Johnson Horizontal Oil Filter Presses fitted 24 plates 36" diameter.
1 Ditto fitted 24 plates 36" square
Six Simon type Portable Slat Conveyors, 20 ft. long, for boxes or bags.
One Pascall Vertical Filter with top gear drive.

Write: RICHARD SIZER LIMITED, ENGINEERS, CUBER WORKS, HULL

1000 STRONG NEW WATERPROOF APRONS, To-day's [value 5s. each. Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons, Springfield Mills, Preston, Lancs. Phone 2198.

If you NEED
CHEMICAL PLANT
We have in stock

Stainless Steel ENCLOSED REACTION KETTLES, approximately 1 ft. 10 in. diameter by 2 ft. 4 in. deep, about ¼ in. thick. Bolted top cover with manhole and glanded agitator entry with stainless steel agitator; mild steel outer jacket for 50 lb. per sq. in. steam pressure and crown wheel and pinion fitted to agitator shaft, drive from fast and loose pulleys, mounted in mild steel outer framework.

"Boreas"-type VACUUM PUMPS by Lacy-Hulbert, XB.2 model, capacity of 40/45 ft. a minute at 355/400 r.p.m., requiring 1½ h.p. to drive; bore, 150 mm. by 90 mm., flywheel, 15 in. diameter by 3 in. face; mounted on bedplate with V-rope and pulley from the existing motor, 1½ h.p., 400 volt 3-phase, 50 cycles.

Unused TIMBER TANK, 3 ft. by 3 ft. by 3 ft. 6 in. deep internally, sides and ends of 2½ in. thick timber and base 1½ in. thick; four ½-in. dia. tie-rods with 3 in. by ¾ in. thick steel straps.

Laurence CASCADE COOLER, tinned copper construction, 3 ft. 10 in. wide by 4 ft. 6 in. high, with water connections and bottom collector tray.

Ask REED BROTHERS (ENGINEERING) LTD.

Tel. AVEnue 1677/8
BEVIS MARKS HOUSE · LONDON · E.C.3

SERVICING

GRINDING, Drying, Screening and Grading of materials undertaken for the trade. Also Suppliers of Ground Silica and Fillers, etc. JAMES KENT, LTD., Millers, Fenton, Staffordshire. Telegrams: Kenmill, Stoke-on-Trent. Telephone: 4253 and 4254, Stoke-on-Trent (2 lines).

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East.

LONDON FIRM offers complete service packing powders of all descriptions, also liquids and chemicals. Long runs only. Containers and packing cases for home and export, made on premises. Near to docks. Own rail sidings. Box No. 2331, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

MANUFACTURING CHEMISTS, Specialists in Emulsification, have surplus capacity for manufacturing emulsions of all types. UNIVERSAL EMULSIFIERS, East Malling, Kent.

PULVERISING and grinding of raw materials.—DOHM LTD., 167, Victoria Street, London, S.W.1.

WANTED

DIETHYLAMINE 99%. Supplies required in quantities up to 6 tons. Write offers to Box No. 2527, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

GLYCERINE, industrial pale straw or B.P., urgently required. State price and quantity (1 cwt. minimum). GEORGE RICE LIMITED, Hudson Bay Works, Warton Road, Stratford, E. 15 (Telephone: Maryland 1222).

INDUSTRIAL BY-PRODUCTS, LTD., 16, Philpot Lane, London, E.C.3., will be pleased to receive particulars of any by-products, waste materials and residues.

URGENTLY required from stock: Thermal Syndicate Vitreosil S-type Coolers and S-type Absorption Vessels for Hydrochloric Acid production. Please send details to Box No. 2529, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WANTED.—Supplies of Nitre Cake in ten-ton lots. Box No. 2126, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WORKING NOTICES

PATENT No. 560665 for "Improvements in processes for the production of vinyl esters of organic acids." Owners desire to meet all demands for the utilization of this patent and invite enquiries from manufacturers in Great Britain prepared to assist in its commercial exploitation. Address in first instance Messrs. POLLAK, MERCER & TENCH, Chartered Patent Agents, 134, Cheapside, London, E.C.2.

THE proprietor of British Patent No. 488598, entitled "Separation of a lighter fluid from a heavier fluid in thermal elements and other apparatus," offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to SINGER, EHLERT, STERN & CARLBERG, 28 E. Jackson Blvd., Chicago 4, Illinois, U.S.A.

PATENTS & TRADE MARKS

KING'S PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a, Queen Victoria Street, London, E.C.4. ADVICE Handbook, and Consultation free. Phone: City 6161.

"POSTLIP"
(No. 635 Mill)
ENGLISH
FILTER
PAPERS

White and Grey, Plain Antique, Crinkled, and Embossed.

All sizes, Squares, Circles and Folded Filter Rolls made to order

Pure Filterings for Laboratory Work, and in quantities for all Industrial purposes.

See report of TESTS made by the National Physical Laboratory a copy of which will be sent on application together with free samples if required.

Postlip Filterings are stocked by all the leading Wholesale Laboratory Dealers

EVANS ADLARD & Co., Ltd.
POSTLIP MILLS
WINCHCOMBE, CHELTENHAM, ENGLAND

WHATMAN
High Grade FILTER PAPERS

The Choice of
Discerning Chemists

WHATMAN FILTER PAPERS by the meticulous care and skill in their manufacture have become the choice of discerning Chemists in every branch of industry.

Samples gladly sent on application.

Stocked by all LABORATORY FURNISHERS in Sealed Boxes

SOLE SALES REPRESENTATIVES:

H. REEVE ANGEL & CO. LTD.
9, BRIDEWELL PLACE, LONDON, E.C.4.
Sole Manufacturers: W. & R. BALSTON LTD.
MAIDSTONE, KENT.

FOR

HOME

AND

EXPORT

OILS AND FATS
DYESTUFFS AND PIGMENTS
FINE AND HEAVY CHEMICALS
PHARMACEUTICALS
WOOD OIL
VEGETABLE OILS
WAXES
GUM
SPICES
COLONIAL AND CHINESE PRODUCTS

M. W. HARDY

& CO. LTD.

6 BILLITER STREET, LONDON, E.C.3.

Telephone : **ROYAL 8343**
Cables : **HARDICHEM**
Codes : **ACME, BENTLEYS**

ROCK STEADY READINGS

MODEL 23

ELECTRONIC pH METER

Automatic temperature compensation. Stabilised for variations in mains frequency as well as voltage. Can be readily used for recording and pH control.

ELECTRONIC INSTRUMENTS LTD
17 Paradise Road, Richmond, Surrey

Drying Trays

- IN HARD RESISTANT VITREOUS ENAMEL
- SPECIALLY PROCESSED TO GIVE MAXIMUM SERVICE
- ALL CORNERS AND EDGES ROUNDED
- SIZES TO SUIT CUSTOMERS REQUIREMENTS
- FINISHED IN GREEN OR OTHER SELECTED COLOUR

NATIONAL ENAMELS LTD.
53, NORMAN ROAD, GREENWICH
LONDON, S.E.10.
Telephone : Greenwich 2266-7 and 2429

TANTIRON

The original and still the best acid resisting high silicon iron alloy!

Sole Manufacturers:

Lennox **Foundry Co. Ltd.**

Glenville Grove, London, S.E.8

Specialists in corrosion problems

THE WORLD'S GREATEST BOOKSHOP

FOYLES

FOR BOOKS

Famed for its excellent Technical Books department

New and secondhand Books on every subject

119-125 CHARING CROSS ROAD, LONDON, W.C.2

Gerrard 5660 (16 lines) ★ *Open 9-6 (inc. Sat.)*

"ZULO"

CARBOY HAMPERS

LEIGH & SONS METAL WORKS

Orlando St. BOLTON.

IRONAC METAL FOR RESISTING ACIDS

VALVES, TAPS AND CASTINGS FOR CORROSIVES

HAUGHTON'S METALLIC CO., LTD.

30, St. Mary-at-Hill, London, E.C.3

"LION BRAND"

METALS AND ALLOYS

MINERALS AND ORES

RUTILE, ILMENITE, ZIRCON, MONAZITE, MANGANESE, Etc.

BLACKWELL'S METALLURGICAL WORKS LTD.

GARSTON, LIVERPOOL, 19

ESTABLISHED 1869

BELTING

AND

ENDLESS VEE ROPES

Superlative Quality

Large Stocks - Prompt Despatch

FRANCIS W. HARRIS & Co. Ltd.

BURSLEM - Stoke-on-Trent

'Phone: Stoke-on-Trent 87181-2

'Grams: Belting, Burslem

KEEBUSH

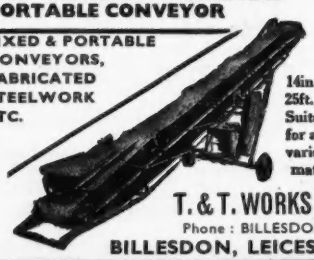
Keebush is an acid-resisting constructional material used for the construction of tanks, pumps, pipes, valves, fans, etc. It is completely inert to most commercial acids; is unaffected by temperatures up to 130°C; possesses a relatively high mechanical strength, and is unaffected by thermal shock. It is being used in most industries where acids are also being used. Write for particulars to—

KESTNER'S

5 Grosvenor Gardens, London, S.W.1

THE "TEANTEE" STANDARD PORTABLE CONVEYOR

FIXED & PORTABLE CONVEYORS, FABRICATED STEELWORK ETC.



14in. belt 25ft. crs. Suitable for a wide variety of materials

T. & T. WORKS LTD

Phone: BILLESDON 261

BILLESDON, LEICESTER

Varley
REGD. TRADE MARK

SLIDER RESISTANCES

A resistance of exceptionally robust construction, wound on high quality vitreous enamelled tubes. Nickel-copper alloy wire is used for the resistance.

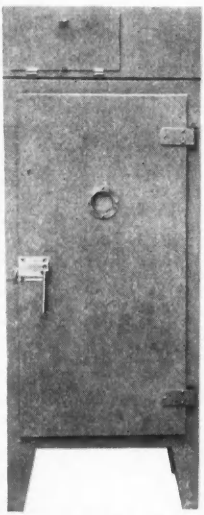
An Ideal product for use in

LABORATORIES · SPEED CONTROL
TEST EQUIPMENT
BATTERY CHARGING

Good delivery Available 3 to 4 weeks

OLIVER PELL CONTROL LTD

TELEPHONE WOOLWICH 1422
CAMBRIDGE ROW WOOLWICH S.E.18



DESICCATOR STORAGE CABINET

For the protection of fine instruments and fabrics, etc., storage of hygroscopic materials, delicate mechanisms, a Desiccator Cabinet is provided. The cabinet is provided with an indicator, which shows whether the relative humidity inside is safe or unsafe, and with Silica Gel Desiccators of ample capacity, provided with electric heaters for their reactivation. Where no electric supply is available the reactivation can be effected by heating the Desiccators in an oven. Wherever high humidities are encountered, especially in the tropics, this Cabinet will prove indispensable for protection against corrosion, mould-growth and rotting.

Full details supplied on request.

SILICA GEL LIMITED

19 GARRICK STREET, LONDON, W.C.2

GRINDING

Grading, Mixing, Sieving or Separating and Drying of materials, etc., undertaken for the trade

Also Suppliers of
GROUND SILICA, FILLERS, AND CHEMICALS

JAMES KENT LIMITED • MILLERS

MANOR STREET, FENTON
STAFFORDSHIRE

Phone : Stoke-on-Trent 48835/6/7 (3 lines) Grams : Kenmil, Stoke-on-Trent

"LION" PACKINGS

FOR ALL PURPOSES AND PRESSURES

WALKER'S TRADE MARK LION PACKING

PLEASE CONSULT US

On all matters concerning

PACKINGS & JOINTINGS

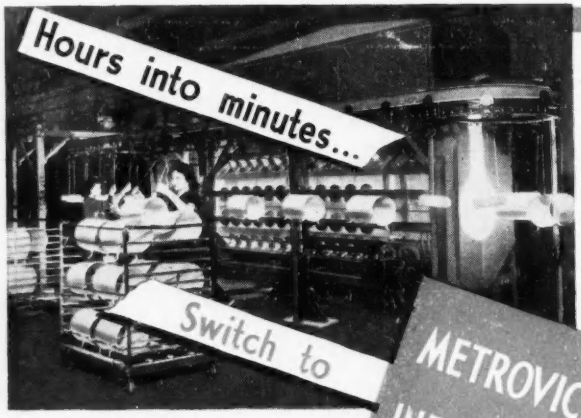
For Chemical Plant

WRITE FOR CATALOGUE R6

JAMES WALKER & CO., LTD.

"LION" WORKS, WOKING, SURREY

PHONE: WOKING 2432 GRAMS: LIONCELLE



PAINT STOVING

A Metrovick Electric Infra Red oven stoving paint on outer cases of water heaters, ranging from 1½ to 30 gallons capacity, in 5-6 minutes.

The plant is equipped with 96 Metrovick Infra Red lamps, having a total loading of 24 kW.

In addition to its ability to reduce vital production time this oven requires a floor space of only 12ft. x 4ft. x 11ft. high.

Metrovick equipments are readily adaptable to various production and factory requirements.

Executives are invited to visit our London Demonstration Department.

Photograph by courtesy of Messrs. Johnson & Phillips Ltd.

METROPOLITAN-VICKERS ELECTRICAL CO. LTD. - NUMBER ONE KINGSWAY - LONDON - W.C.2

A/T 7121

Printed in Great Britain by THE PRESS AT COOMBELANDS, Ltd., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154, Fleet Street, E.C.4, 13 September 1947. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.